REVISION OF W. M. GABB'S TERTIARY MOLLUSCA OF SANTO DOMINGO.

By Henry A. Pilsbry.

The Tertiary beds of northern Santo Domingo were first brought to scientific notice by the receipt in London of a collection of fossils made by Mr. T. S. Heneken,[1] and described by J. Carriker Moore and G. B. Sowerby.[2] Subsequently Mr. Heneken reported on the geology and Mr. Moore on another sending of fossils.[3] The Heneken collection also served as the basis of a paper by Mr. R. J. L. Guppy,[4] describing further species, and for numerous notes in other publications by the same author.

William More Gabb, in the course of a geological reconnaissance of Santo Domingo in the years 1869–1871, collected extensively in and about the region covered by Mr Heneken's work. His observations on the geology and descriptions of the fossils were published by the American Philosophical Society,[5] and the fossils were presented to The Academy of Natural Sciences of Philadelphia. Unfortunately, Gabb was not able to figure his species. The descriptions are not always sufficiently full to insure their recognition when encountered in other beds except by reference to the original specimens. The progress of tropical American paleontology has undoubtedly been impeded by the uncertainty attaching to many of Gabb's Santo Domingan species.

A certain number of fossils of Santo Domingo and Haiti have been described or discussed by Dr. W. H. Dall, in his great work on the Tertiary fauna of Florida and in the Proceedings of the U. S. National Museum. Others have been published by Dr. A. P. Brown and the writer in papers on fossils of the Canal Zone, Colombia, and Haiti.

---

[1] Mr. Heneken's name was spelled Heniker in the original publication.

[2] Quarterly Journal of the Geological Society, vol. vi, 1849.

[3] Same Journal, vol. ix, 1853.

[4] Quarterly Journal of the Geological Society, vol. 32, 1876, pp. 516–532.

[5] Notes on the Topography and Geology of Santo Domingo. Trans. American Philosophical Society, XV, pp. 49–259. Separate copies with special title-page dated 1873. The exact date of publication remains uncertain. Dr. I. Minis Hays, Secretary of the Society, informs me that the records of the Publication Committee were not preserved; but a proof of Gabb's map was exhibited at the meeting of October 2, 1873. The paper was reviewed in the American Journal of Science for March, 1874. It may be inferred that the work was not actually distributed until late in 1873 or early in 1874. In the absence of proof to the contrary, the date of the title-page may be accepted.

Gabb described the new genera and illustrated their type species in: Description of some new genera of Mollusca. Proc. A. N. S. Phila. for 1872, pp. 270–274, pl. 9–11, published Feb. 11, 1873.

Some years ago Mr. Charles W. Johnson and the writer undertook to supplement Gabb's work by the preparation of figures of his type specimens with notes on these and other specimens contained in his collection. The work was interrupted by Mr. Johnson's removal to Boston, and its completion, devolving upon the senior author alone, was delayed by the pressure of other duties. The paper was finally submitted to the Academy for publication February 27, 1917,[6] Under existing conditions prompt publication could not then be made, so that an extract containing descriptions of new species was published.[7] Meantime, Miss C. J. Maury had issued the text of a report on the geology and paleontology of Santo Domingo,[8] anticipating the appearance of our paper by a few days. Having access to a partial set of Gabb's specimens, Miss Maury, with great enterprise, anticipated our revision by renaming certain of the Gabb species having invalid names, and described others from his collection. In now publishing our notes and figures, such synonymy as was obvious in looking over Miss Maury's work has been noted, and some paragraphs which now appear superfluous have been deleted; otherwise the paper is left as originally written.[9] When a critical comparison of the Gabb and Maury specimens can be made doubtless some further cases of identity will be apparent; but it is clear that each collection contains many species not in the other. It is an evidence of the remarkable richness of the faunas.

Gabb had selected a type series of his fossils. In a few cases which we have noted below, his trays contained more than one form, but practically all of the species described by us as new were shells which Gabb had determined incorrectly, others which he had set aside as duplicates; or they were selected from packages which, from their condition and the dates of newspapers used as wrappings, apparently had not been opened since they were packed in Santo Domingo.

---

[6] Proc. A. N. S. Phila., 1917, p. 82.

[7] New Mollusca of the Santo Domingan Oligocene, by H. A. Pilsbry and C. W. Johnson. Proc. A. N. S. Phila., 1917, pp. 150–202. The separate copies were dated May 4, but on the reverse of title-page of the Proceedings the date is given as May 5, 1917.

[8] Santo Domingo Type Sections and Fossils. Bull. American Paleontology, v, pp. 1 -120 March 31, 1917, pp. 121 - 251, April 20,1917. The plates appeared May 29, 1917.

[9] Certain recent changes in generic nomenclature might have been adopted, but it seemed better to leave the latter uniform with our paper of 1917. The valuable papers of C. W. Cooke, 1919, and B. Hubbard, 1920, were received since this paper was completed.

With two exceptions[10] the species enumerated in Gabb's paper are furnished with labels (names only) in his hand, under card labels written by Professor Heilprin; all of the small species were in vials, the large ones loose in the trays. We found no cases of transposition of specimens, and with two exceptions[11] every species or specimen mentioned by Gabb has been found, together with its proper label.

With two or three exceptions, none of the labels bore any indications of locality or horizon further than "Santo Domingo." What little information exists of more definite character is contained in Gabb's paper, or sometimes may be inferred from his specific names. The zonal relations of many of the species have been determined by Miss Maury.

In a few cases the gangue indicates that certain species are from the *Orthaulax* zone, which is apparently synchronous with the Tampa Silex beds, while the remainder so far as we can judge is later, having much in common with the Gatun and Bowden beds, now generally considered Miocene. This was also Gabb's opinion.

Gabb's descriptions give evidence of haste and the use of a lens of low power only. Dimensions of the shells were often omitted, and when given are almost invariably inexact, as though estimated rather than actually measured. There are many typographical errors, due to the circumstance that the paper was printed after his departure for Costa Rica. He did not see the proofs. We note these things merely to account for occasional discrepancies between the original descriptions and the supplementary descriptive notes to be found in this revision.

Certain species not Santo Domingan have been named incidentally in the course of this work, as follows:

Conus maculospira n.n. for *planiliratus* Sowerby. Recent.

Conus consobrinus ultimus Pils. & Johns. Pliocene, Costa Rica.

Conus pseudomarginatus, n. n. for *C. marginatus* Cossm., not Sowb. Martinique.

Xancus textilis jamaicensis. Bowden, Jamaica Miocene.

Bursa crassa bowdenensis. Bowden, Miocene.

Cypræa raymondrobertsi bowdenensis. Bowden, Miocene.

Pyramidella insularum, n. n. for *P. canaliculata* Sowb. Recent.

---

[10] [11] The specimens of *Tellina alternata* and *T. punicea* (?) in the collection have lost their labels; it is not certain that they are Gabb's examples, or that the former is from Santo Domingo.

Arca idiodon. Wilmington, N. C.
Pecten uselmæ Pils. & Johns. Bowden, Miocene.

PTEROPODA.

LIMACINIDAE.

Limacina inflata (Orbigny) Text-fig. 1.

Planorbella imitans Gabb, Trans Amer. Philos. Soc., xv, 1873, p. 201; Proc. A. N. S. Phila. 1872, p. 270, pl. 11, fig. 2 (1873).
Atlanta inflata Orbigny, Voy. dans l'Amer. Mérid. v, p. 174, pl. 12, figs. 16–19.
Limacina inflata (d'Orb.), Pelseneer, Challenger Reports, Zoology, xxiii, p. 17.

Gabb's figure of this species is poor, giving the idea of a bilaterally symmetrical discoidal spiral, whereas the spire is very little sunken, and the umbilicus is deep. The type is somewhat broken and not quite mature, 1 mm. in diameter. We do not hesitate to refer it to the recent *L. inflata*, for which there are many Atlantic and Antillean records.

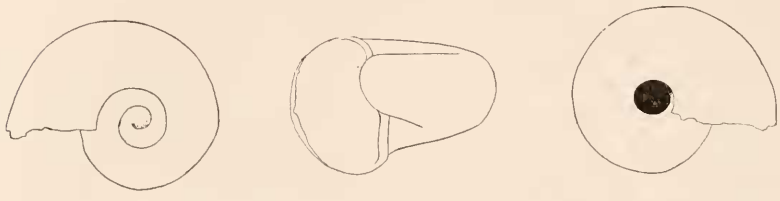


Fig. 1. *Planorbella imitans* Gabb, upper, profile and basal views of the type (=*Limacina inflata*).

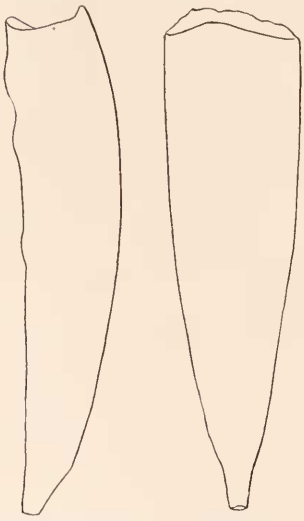


Fig. 2. *Vaganella undulata* (Gabb), two views of the type.

Besides the type of *Planorbella imitans*, no. 2895 A. N. S. P., there are two smaller examples and some fragments.

The term *Planorbella* Gabb (not Haldeman) may be added to the synonymy of *Limacina*. It is identical with *Embolus*, which includes openly umbilicate Limacinas with slightly sunken spire, and more or less of a median projection of the lip in the adult stage.

Vaganella undulata (Gabb) Text-fig. 2.

Balantium undulatum Gabb, Trans. Amer. Philos. Soc, xv, 1873, p. 200.

The curved shell, with three low waves on the concave side, is characteristic. Length 6.5, greatest diameter 1.8 mm.

Type no. 2892 A. N. S. P. One specimen.

Styliola sulcifera Gabb. Text-fig. 3.

S. sulcifera Gabb, Tr. Amer. Philos. Soc. xv, 1873, p. 200.

This is a rather rapidly tapering species, with the sulcus slightly spiral. The section is not quite circular. The larger end is broken as shown in the figure.

Length 3.9, diameter at larger end 0.9, at smaller 0.3 mm.

Type is no. 2893 A. N. S. P.

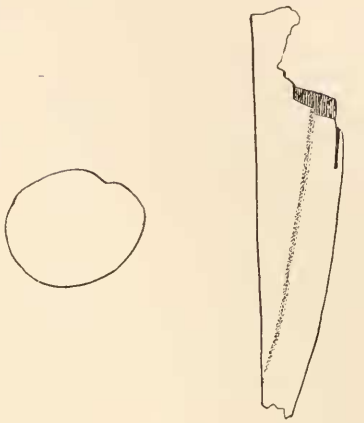


Fig. 3. *Styliola sulcifera* Gabb, lateral view and outline of oral end.

Diacria bisulcata Gabb. Text-fig. 4.

Diacria bisulcata Gabb, Trans. Amer. Philos. Soc. xv, 1873, p. 200.

The broader, smooth, mesial convexity will distinguish this species

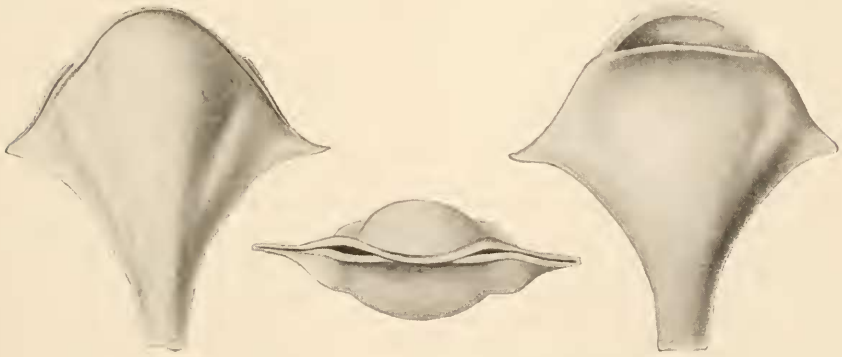


Fig. 4. *Diacria bisulcata*, Gabb, type.

from the recent *D. trispinosa*. The type, no. 2894 A. N. S. P., measures, length 4.3, width 4.2, thickness 1.4 mm.

GASTROPODA.

TECHTIBRANCHIATA.

ACTEONIDAE.

Acteon subtornatilis Pils. and Johns. Plate XXIII, fig. 15.
Proc. A. N. S. Phila. 1817, p. 150.

Acteon punctostriatus (C. B. Ad.)
Actæon cubensis Orb., Gabb, Trans. Amer. Philos. Soc. xv, p. 245.
Actaeon riomacnsis Maury, Bull. Amer. Pal. V, p. 11.

Somewhat abundant. Another decidedly more slender species is represented by one imperfect shell.

Rictaxis oryza (Gabb) Plate XXIII, fig. 12.
Actæonidea oryza Gabb, Tr. Amer. Philos. Soc. xv, p. 245; Proc. A. N. S. Phila. 1872, p. 273, pl. 11, figs. 8, 8a (Feb. 11, 1873).

This species is type of *Actæonidea* Gabb. The sole specimen, no. 3181 A. N. S. P., measures, length 6.7, diam. 2.5 mm.

ACTEOCINIDAE.

Tornatinidae of authors.

Acteocina canaliculata (Say)

Acteocina wetherilli (Lea)
Tornatina wetherilli Lea. Dall, Trans. Wagn. Inst. iii, p. 15.
Tornatina coixlacryma Guppy, Geol. Mag. iv, p. 500.

Acteocina recta (Orb)
Tornatina recta Orb., Gabb, Tr. Amer. Philos. Soc. xv, p. 246.

Acteocina candei (Orbigny)

All of these species were taken in some abundance.

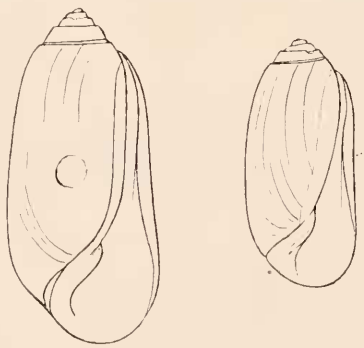


Fig. 5. *Acteocina subbullata* P. and J.

Acteocina subbullata Pils. and Johns. Text-fig. 5.
Proc. A. N. S. Phila. 1917, p. 150.

Retusa biforis Pils. and Johns. Text-fig. 8.

Proc. A. N. S. Phila. 1917, p. 151.

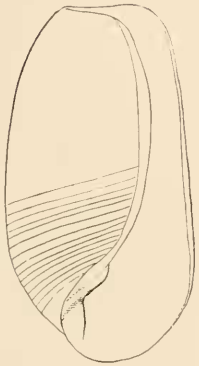


FIG. 6.
Cylichnella bidentata (Orb.)
(recent)

FIG. 7.
Cylichnella ovum-lacerti (Guppy).

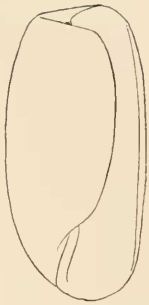


FIG. 8.
Retusa biforis P. & J.

Retusa sulcata fossilis n. subsp.

Cf. *Bulla sulcata* Orb., Moll. Cuba i, p. 129, pl. 4*bis*, figs. 9–12.
Cylichna sulcata d'Orb. Gabb, Trans. Amer. Philos. Soc. xv, p. 245.

The fossils agree in sculpture with *R. sulcata* but they are larger and relatively narrower, three of the largest measuring:

Length 2.8, diam. 1.15 mm.

Length 2.8 diam. 1.35 mm.

Length 2.9, diam. 1.25 mm.

The last two are conspicuously swollen near the base.

Type no. 3186 A. N. S. P.

Cylichnella ovumlacerti (Guppy) Text-fig. 7.

Cylichnella bidentata d'Orb., Gabb, Trans Amer. Philos. Soc. xv, 1873, p. 246; Proc. A. N. S. Phila. 1872, p. 273. Not *Bulla bidentata* d'Orbigny.
Tornatina (*Cylichnella*) *ovum-lacerti* Guppy, Dall, Proc. U. S. Nat. Mus. XVIII, p. 27.

The Santo Domingan shells are cylindric-oblong, obtusely rounded below, narrowly truncate at summit; glossy, encircled by many impressed spiral lines in the lower half. The vertex is concave, surrounded by a rather sharp keel. Aperture somewhat racket-shaped. Columella having a strong, upper spiral plait which continues to the outer edge of the columellar callus, and a small, subvertical, sigmoid fold below. Outer lip very thick, bevelled to the edge.

Length 4, diam. 2.4 mm.

This species is far more solid than *C. bidentata* (Orb.), and constantly broader in a considerable series of both examined. For comparison a figure is given of a specimen of *C. bidentata* measuring length 3.7, diam. 1.9 mm., from *Albatross* Station 2275, off North Carolina (Text-fig. 6).

The only published figure of *C. ovumlacerti* is so inadequate that one of Gabb's specimens is illustrated in text-fig. 7.

Cyclichna (?) aff. *Cylichnella bidentata* d'Orb., of Toula, Jahrb. K. K. Geol. Reichsanst., Bd. 61, 1911 p. 510, pl. 31, fig. 25, may be the young of this species.

The genus *Cylichnella* has been subordinated to *Cylichna* by some authors, to *Tornalina* by others; but it appears to us generically distinct from both, being distinguished from *Cylichna* by characters of the columella and from *Tornatina* by the wholly buried spire.

Volvula oxytata Bush

Volvula cylindrica Gabb, Trans. Amer. Philos. Soc. xv, 1873, p. 246. (Not of Carpenter, 1865, or of E. A. Smith, 1871.)

This species was taken rather abundantly. It appears to be quite identical with the recent form.

The type lot of *V. cylindrica* is no. 3179 A. N. S. P.

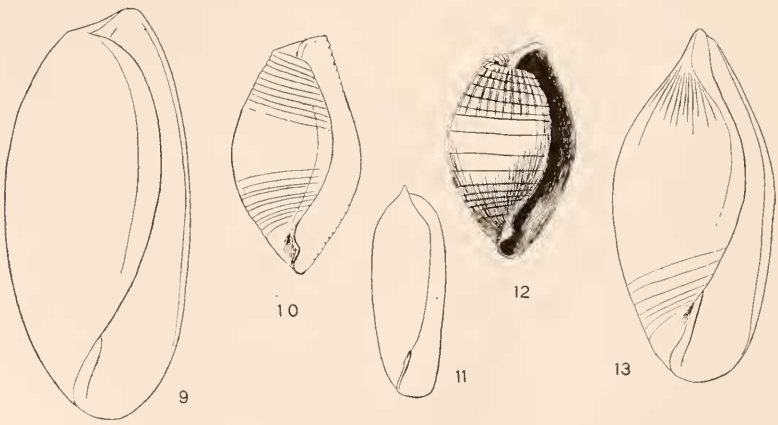


Fig. 9. *Volvula cylichnoides* P. and J. Fig. 10, *Atys cinctorii* P. and J. Fig. 11, *Volvula paralella* P.& J. Fig. 12, *Atys sulculorum* P. and J. Fig. 13, *Volvula ornata* P. and J.

Volvula ornata Pils. and Johns. Text-fig. 13.

Proc. A. N. S. Phila., 1917, p. 151.

Volvula parallela Pils. and Johns. Text-fig. 11.

Proc. A. N. S. Phila., 1917, p. 151.

Volvula cylichnoides Pils. and Johns. Text-fig. 9.

Proc. A. N. S. Phila., 1917, p. 151.

Cf. Retusa yaquensis Maury, which, however, has spiral sculpture.

SCAPHANDRIDAE.

Atys cinctorii Pils and Johns. Text-fig. 10.

Proc. A. N. S. Phila., 1917, p. 152.

Atys sulculorum Pils. and Johns. Text-fig. 12.

Proc. A. N. S. Phila. 1917, p. 152.

Atys (Aliculastrum) caribaea (Orb.)

A. caribaea Orb., Pilsbry, Man. Conch. xv, p. 274, pl. 48, fig. 12.
?*A. riiseana* Mörch, Malak. Bl. xxii. p. 173.

A few specimens agree with recent shells which the writer has referred to d'Orbigny's species. *Cf.* also *Atys gracilis* Dall, from the Chipola horizon.

AKERIDAE.

Haminœa granosa (Sowerby)

Bulla granosa Sowerby, Trans. Geol. Soc. Lond. iv, 1849, p. 51, pl. 10, fig.10.

This species is unusually solid for the genus, and more strongly sculptured than the recent forms.

BULLARIIDAE.

Bullaria solida (Gmel.)

Bulla solida Gmel., Pilsbry, Man. Conch. xv, p. 335.

Several specimens, the largest 40.5 mm. long, 30.5 wide, appear to be referable to this recent species. It has been described as *Bullaria sarahberlinerœ* Maury.

Bullaria paupercula (Sowerby)

Bulla paupercula Sowb., Gabb. Tr. Amer. Philos. Soc. xv, p. 246.

Gabb has identified a series of specimens very similar to the recent *B. amygdalus* Dillw., with the imperfectly defined species of Sowerby. Without access to Sowerby's type, the question of specific identity cannot profitably be taken up.

RINGICULIDAE.

Ringicula semilimata Dall.

Ringicula semilimata Dall, Proc. U. S. N. Mus. xviii. 1895, p. 24; Trans. Wagner Inst. Sci. iii, pt. 6, pl. 60, fig. 24.

Ringicula semistriata? Orb., Gabb, Trans. Amer. Philos. Soc. xv, p. 225.
Ringicula dominicana Maury, Bull. Amer. Pal. v, p. 21.

Minute Ringiculas, from 1.3 to 1.9 mm. long, are abundant in the Santo Domingo material. In shape and sculpture they show a good deal of diversity—forms like *R. semilimata*, *R. guppyi*, and others; there may be three or four species, as species go in this genus. Without more extended study than we have time for, exact identifications cannot be made. *R. hypograpta* Brn. & Pils., from the Gatun formation, is another similar, but slightly larger, form.

NUCLEOBRANCHIATA.

ATLANTIDÆ.

Atlanta rotundata Gabb. Text-fig. 15.

Atlanta rotundata Gabb, Trans. Amer. Philos. Soc. xv, 1873, p. 201.

The shell is rather extensively broken. It consists of $5\frac{1}{2}$ whorls the first 4 rather closely wound, with sculpture of four spiral threads on the visible part of the penult whorl. The last whorl shows very minute spiral striation under strong magnification, and there is an inconspicuous groove on each side of the periphery, which shows no trace of a keel. If present it must have been membranous. The diameter, as broken, is 2.5 mm.

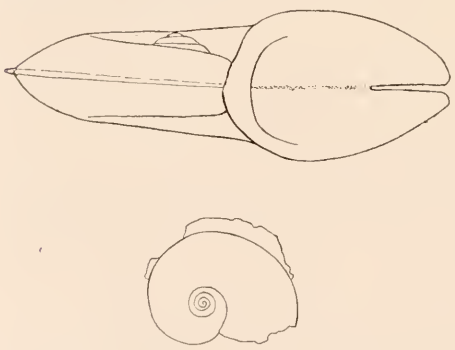


Fig. 14. *Atlanta cordiformis* Gabb.

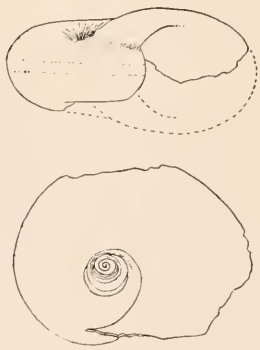


Fig. 15. *Atlanta rotundata* Gabb.

The rounded whorl, without peripheral keel, is similar to that of *Oxygyrus*, but the embryonic shell is that of *Atlanta*. It may form a subgenus of *Atlanta* to be called *Atlantidea*. *Atlanta souleyeti* Smith appears to belong to the same group. It differs from *rotundata* by the more prominent spire. In the figure of the ventral face (fig. 15, above) the spire is concealed behind the lip.

Type no. 2891 A. N. S. P.

Atlanta cordiformis Gabb. Text-fig. 14.

Atlanta cordiformis Gabb, Trans. Amer. Philos. Soc. xv, 1873, p. 201.

A very minute species, composed of $4\frac{1}{2}$ whorls, the last carinate and bearing the usual peripheral lamina, which is mainly broken away. The aperture is cordiform, its inner edge in contact with the preceding whorl, not supported on the peripheral lamina. This may be a feature of immaturity. It is a much smaller shell than *A. peronii* having the same number of whorls.

Diameter 1.5, greatest width of aperture 0.55 mm.

Type and two other specimens are no. 2896 A. N S. P.

Atlanta peronii Leseuer.

Two small specimens, the largest 3.7 mm. in diameter. It is evidently adult, somewhat over half a whorl being in contact with the peripheral lamina only. On account of its small size, the reference to *A. peronii* is made with some doubt, yet in other characters we find no material difference.

PROSOBRANCHIATA.

TEREBRIDAE.

The larger Terebras of Santo Domingo are in some confusion, owing chiefly to the absense of figures of the types of three species described by Sowerby. Guppy[13] figured "*T. sulcifera* Sowerby," from the Heneken collection, but as he united *sulcifera*, *inequalis* and *bipartita* of Sowerby, we do not know definitely which was figured, nor whether his shell was from the original or the second Heneken collection. The *T. bipartita* of Dall [14] appears to us to be a different species from that of Sowerby.

Gabb's identifications were apparently erroneous. His *T. inaequalis* is *T. haitensis* of Dall,[15] and his *bipartita* is the form we refer to *inaequalis* Sowerby. *T. robusta* Hinds, of Gabb, is *T. gabbi* Dall,

---

[13] Quarterly Journ. Geol. Soc. vol. 32. pl. 29, fig.8.

[14] *Terebra* (*Acus*) *bipartita* Sowerby, Dall, Proc. U. S. Nat. Mus. xviii, p. 38, with vars. *spinifera*, *oligomitra*, and *cirrus*, Trans. Wagn. Inst. iii, pl. 59, figs. 13, 28, 29.

[15] *Terebra* (*Hastula*) *haitensis* Dall, Proc. U. S. Nat. Mus. xviii, p. 35. *Terebra* (*Oxymeris*) *bipartita*, etc., Dall, Trans. Wagn. Inst. iii, pl. 59, fig. 30; Potrero, Rio Anima, Santo Domingo.

[16] *Terebra gabbi* Dall, Proc. U. S. N. M. xviii, p. 34; Trans. Wagn. Inst. iii, pl. 59, fig. 31; Portrero, Rio Anima. *T. robusta* Hinds, Gabb, Trans. Amer. Philos. Soc. xv, p. 224.

a form which needs comparison with *T. sulcifera* Sowb. There is a considerable amount of material in the collection, but as Gabb described no new species in this group, we will not enter into the subject further. No revision of any value can be made until Sowerby's types are figured and more fully described.

In addition to the species named above, *Terebra amitra* Dall[17] has been described from the Potrero, Rio Amina.

A very large species of *Terebra*, distinct from all of the above, is represented by one broken and much worn specimen no. 2972. It has slightly over 4 whorls, with a length of 85.5, diam. 26 mm. There are two raised bands around the posterior part of the whorls.

Terebra gatunensis Toula.

Terebra (Oxymeria) gatunensis Toula, Jahrb. K.–K. Geol. Reichsanst., vol. 58, 1909, p. 705, pl. 25, fig. 14.
Terebra gatunensis Toula, Brown and Pilsbry, Proc. A. N. S. Phila. 1911, p. 339, pl. 22, fig. 2.

An abundant species in the Santo Domingo beds. Gabb referred the specimens to *T. dislocata*. About half of them have spiral lines upon the superior band, as in *T. wolfgangi* Toula, but there are more spiral cords below the band than in typical *wolfgangi*.

Terebra dislocata Say.

The series referred to this recent species is highly variable, and a further revision may eventually be made.

There is also a series of small specimens possibly related specifically to *T. protexta* Conr.

Terebra baculiformis Pils. and Johns. Plate XXII, figs. 5, 6.

Proc. A. N. S. Phila. 1917, p. 152.

Terebra hitia Pils. and. Johns. Plate XXII, fig. 1, 2.

Proc. A. N. S. Phila. 1917, p. 152.

TURRITIDAE.

Turris albida (Perry)

Pleurotoma albida Perry, Conchology, 1811, pl. 32, fig. 4.
Pleurotoma haitensis Sowerby, Q. J. Geol. Soc., vi, 1849, p. 50,
Pleurotoma barretti Guppy, Q. J. Geol. Soc., xxii, 1866, p. 290, pl. 17, fig. 6.
Turris (Surcula) virgo Lam. Gabb, Tr. Am. Philos. Soc., xv, p. 206.
Turris albida Perry, Dall, Bull. 90, U. S. Nat. Mus., p. 38.

This well-known species is abundant in the Santo Domingan collection no. 2942.

---

[17] *Terebra (Acus) amitra* Dall, Proc. U. S. N. Mus. xviii, p. 39. *Terebra (Oxymeris) amitra* Dall. Trans. Wagn. Inst. iii, pl. 59, fig. 19.

Turris rara Gabb. Plate XVII, fig. 1.

Turris (*Surcula*) *rara* Gabb, Tr. Am. Philos. Soc., xv, 1873, p. 207.

This is represented by one imperfect specimen. The whorls are flat, sculptured with spiral raised lines, about fifteen between sutures on the penult whorl. There are crowded, sharp and irregular, axial striae. The upper whorls have a slight median angle. The slit-fasciole is not distinctly differentiated on the last two to two-and-a-half whorls, but above that it is slightly prominent and weakly nodose.

Length (broken at both ends) 42.5, diam. 16 mm

Type no. 2941 A. N. S. P.

Surcula jacquensis (Sowerby) Plate XXII, fig. 21, 22.

Pleurotoma jacquensis Sowerby, Q. J. Geol. Soc., vi, 1849, p. 51.

Considered by Gabb to be a synonym of *Drillia henekeni*, but it is a distinct species of *Surcula*. The last whorl has nine or ten large axial ribs which are crossed on the whorls of the spire by six spiral cords, the upper one sometimes accompanied by one or two threads. On the last whorl these cords and threads number about twenty-five, and in many specimens alternate in size, especially towards the anterior end. There is a spiral raised line just below the suture, and the anal fasciole has weak growth-lines or is smooth.

Length 67.3, diam. 26 mm.

Type no. 2939 A. N. S. P.

Surcula longicaudata (Gabb) Plate XVII, fig. 2.

Turris (*Surcula*) *longicaudata* Gabb, Tr. Am. Philos. Soc., xv, 1873, p. 208.

This species resembles *Drillia consors* somewhat in form and sculpture, but has the generic characters of *Surcula*. The two apical whorls are smooth, remaining whorls of the spire with large, rounded slightly protractive ribs, which are crossed by six acute, spiral threads, which are a little widened where they cross the ribs. Below the suture, and extending to the angle of the anal fasciole, there is a series of short, slightly retractive riblets. The last whorl is evenly reticulated with axial and spiral ridges, tubercular at their intersections. The interstices are minutely papillose.

Length 26, diam. 7.3 mm.; whorls 10.

Type no. 2938 A. N. S. P.

Surcula humerosa (Gabb) Plate XVII, figs. 4, 5,.

Turris (*Surcula*) *humerosa* Gabb, Tr. Am. Philos. Soc. xv. 1873, p. 208.

A variable species represented by three specimens, fig. 4 representing the intermediate form. One extreme approaches very close

to *Pleurotoma servata* Conr., from the Vicksburg Oligocene. The chief difference is the greater sinuosity of the growth lines of the body whorl, which run backward both above and below the convex portion of the whorl to near the suture; also in having a more prominent angle at the periphery.

Length of specimen figured 20.5 mm.; a larger specimen, fig. 5, in which the spire is broken, measures 24.5 mm. Another example has the nodes partially obsolete on the last whorl.

Type no. 2940 A. N. S. P. (fig. 4).

Drillia fusiformis (Gabb) Plate XVII, fig. 8.

Defrancia fusiformis Gabb, Tr. Am. Philos. Soc., xv, 1873, p. 209.

Two apical whorls are smooth, the rest having large, rounded, axial ribs crossed by four keel-like ridges on the whorls of the spire, and about twenty on the last whorl, the intervals densely striated spirally. The sinus is deep and strongly contracted in front when the lip is perfect.

Length 36, diam. 11.5 mm.; 12 whorls.

The shell is variable in the length of the anterior canal, but the extremes are connected in the series before us.

Type no. 2937 A. N. S. P.

Drillia henekeni (Sowerby) Plate XVII, fig. 3.

Pleurotoma henikeri Sowerby, Q. J. Geol. Soc., vi, 1849, p. 50, pl. 10, fig. 6.
Turris (Surcula) henekeni Gabb, Tr. Am. Philos. Soc. xv, p. 207.
Not *Drillia henekeni* (Sowerby), Cossmann, Journ. de Conchyl., lxi, 1913, pl. 3, figs. 10, 11.

This shell is well shown in Sowerby's figure. There are many specimens in the Gabb collection, the largest 69 mm. long, 18 wide. No. 2936.

Drillia sororcula Pils. and Johns. Plate XVII, fig. 6.

Proc. A. N. S. Phila. 1917, p. 153.

Drillia subgibbosa Pils. and Johns. Plate XVI, fig. 14

Proc. A. N. S. Phila. 1917, p. 153.

Drillia elocata Pils. and Johns. Plate XVI, fig. 9.

Proc. A. N. S. Phila. 1917, p. 153.

Drillia winchesteræ n. sp. Plate XVI, figs. 7, 8.

Very similar to *D. elocata*, but it is more slender with a longer anterior canal and a deeper posterior sinus, the anal fasciole and the spaces between the spiral ridges being distinctly striate spirally, in each interval about 6 striae. There are seven broad, rounded axial folds on the penult whorl and on the last, weakening on the

anal fasciole. On the face of the last whorl there are 18 narrow, high spiral ridges, a smaller cord above the upper one and a strong, acute cord below the suture. The outer lip is smooth within; inner lip a little raised. The anal sinus is deep, rounded posteriorly, contracted a little anteriorly.

Length (the early whorls lost) 26.5, diam. 8.3 mm.; $6\frac{1}{2}$ whorls remaining.

Type no. 3980 A. N. S. P.

This species was at first considered a slender form of *D. elocata*, but it is clearly distinct. Named for Miss Helen Winchester, who has illustrated this paper.

Drillia consors (Sowerby) Plate, XVI, fig. 3.

Turris (*Drillia*) *militaris* Hinds, Gabb, Tr. Am. Philos. Soc. xv, 1873, p.207, (not of Hinds, Proc. Zool Soc. 1843; Reeve, Conch. Icon, No. 53.).

Pleurotoma consors Sowb., Q. J. Geol. Soc. vi, 1849, p. 50; Guppy. Q. J. Geol. Soc. 1876, p. 527, pl. 28, fig.7.

It seems strange that in the absence of specimens of *D. militaris*, Gabb referred *D. consors* to that recent species.

A specimen of *D. consors*, 41.6 mm. long, 12 wide, has 23 axial ribs on the last whorl, and about 18 spiral cords. A strong presutural keel revolves above the anal fasciole.

It is an abundant shell. No. 2935.

Drillia macilenta rectaxis n. subsp. Plate XVI, figs. 1, 2.

Cf. Drillia alesidota Dall, var. *macilenta* Dall, Rep. *Blake* Gastrop., in Bull. Mus. Comp. Zool. xviii, 1889, p. 85, pl. 36, fig. 1.

Judging by the description and figure, this is very near *D. alesidota macilenta* Dall, but it differs by the columellar lip, which is straight to the base, and by the narrower aperture.

Length 44, diam. 10.5 mm.

Type no. 2934 A. N. S. P.; 17 other specimens.

Drillia gatunensis alia n. subsp. Plate XVII, fig. 7.

Closely related to *D. gatunensis* Toula, but it differs by having the spiral grooves simple throughout, not occupied by minor spirals on the base; the vertical ribs do not retract strongly above the shoulder as they do in *D. gatunensis*, in which the growth lines are much more deeply sinuated at the anal fasciole.

Length 31, diam. 10.5 mm.

Length 41 mm.

Type no. 2919 A. N. S. P.

Drillia venusta (Sowerby) Plate XVII, fig. 14.

Pleurotoma venusta Sowerby, Q. J. Geol. Soc. vi, 1849, p. 50, pl. 10, fig. 6.

This species has been well figured by Sowerby and is represented by many examples in the Gabb collection (no. 2931). It has no direct relationship with *D. jamaicensis* Guppy, which has been united with it (Proc. U. S. N. Mus. vol. 19, 1896, p. 305). They are conspicuously diverse in sculpture, form and size, in large series of both we have examined. *D. venusta* attains a length of over 45 mm., while 19 mm. is about the maximum size of *jamaicensis*.

Drillia jamaicensis (Guppy)

Pleurotoma jamaicensis Guppy, Q. J. Geol. Soc. xxii, 1866, p. 290, pl. 16, fig. 6.
Drillia ebenina Dall, Trans. Wagn. Free Inst. Sci. iii, pt. 1, 1890, p. 33, pl. 2, fig. 8.

Dr. Dall says of his *D. ebenina*, "Miocene of Santo Domingo (Gabb); Pliocene of the Caloosahatchie beds. Recent on the shores of the Gulf of Mexico from Florida to Vera Cruz." And after the description, "This fine species was first found living in shallow water on the Florida Keys by H. Hemphill. I find specimens of it together with several other species confused together under the name of *jamaicense* Guppy in the Gabb collection at Philadelphia." Some error is involved in these statements, as there is no such shell in the Gabb collection, and Gabb makes no reference to *"jamaicensis"* in his work. There are specimens of *Pleurotoma jamaicense* Guppy, from Jamaica, in the collection of the Academy, obtained from Mr. Vendryes and from other sources. These agree well with Dr. Dall's description and figure of *D. ebenina*, and with specimens from the Caloosahatchie Pliocene.

While this species may occur in Santo Domingo, we have at present no evidence that it does.

Drillia squamosa (Gabb) Plate XVI, figs. 4, 5.

T. (*Drillia*) *squamosa* Gabb, Trans. Amer. Philos. Soc. xv, 1873, p. 208.
Pleurotoma squamosa Gabb, Guppy, Q. J. Geol. Soc. 1876, p. 527, pl. 29, fig. 7.

The whorls bear stout oblong, peripheral nodes, about 9 on the penult, each over-ridden by an acute protractive raised line which is a former free lip-edge. There is a strong varix a short distance behind the lip. The whole surface has a fine sculpture of irregular, interrupted, crimped spiral threads, the intervals densely and much more minutely crossed by raised growth striae. The outer lip is broken in all of the specimen.

Length 56.5, diam. 23 mm., with 8 whorls remaining, the early ones lost.

Length 59. diam. 22.3 mm., with $9\frac{1}{2}$ whorls remaining (type).

Type no. 2922 A. N. S. P.

A paratype is figured, since the type, while larger, has the aperture more broken. The dimensions given by Gabb were merely approximate. He seems rarely to have actually measured his specimens.

Drillia callistura Pil., and Johns. Plate XVI, fig. 12.

Proc. A. N. S. Phila., 1917, p. 154.

Drillia ischnatracta Pils. and Johns. Plate XVI, fig. 15.

Proc. A. N. S. Phila., 1917, p. 154.

Drillia scala Pils. and Johns. Plate XVI, figs 16, 17.

Proc. A. N. S. Phila., 1917, p. 155.

Drillia hexapleura Pils. and Johns. Plate XVIII, fig. 1.

Proc. A. N. S. Phila., 1917, p. 155.

Drillia mimula Pils. and Johns. Plate XVI, fig. 13.

Proc. A. N. S. Phila., 1917, p. 155.

Drillia esculenta Pils. and Johns. Plate XVI, fig. 18.

Proc. A. N. S. Phila., 1917, p. 156.

Drillia orthopleura Pils. and Johns. Plate XVI, fig. 19.

Proc. A. N. S. Phila., 1917, p. 156.

Drillia callistopleura Pils. and Johns. Plate XVI, fig. 6.

Proc. A. N. S. Phila., 1917, p. 157.

Drillia lissotropis dorsuosa Pils. and Johns. Plate XVIII, fig. 5.

Proc. A. N. S. Phila., 1917, p. 157.

Type no. 2959 A. N. S. P.

Drillia foveolata Pils. and Johns. Plate XVI, fig. 20.

Proc. A. N. S. Phila., 1917, p. 157.

Drillia parkeri (Gabb) Plate XVI, fig. 21.

T. (Drillia) parkeri Gabb, Tr. Am. Philos. Soc. xv, 1873, p. 207.

A much lengthened, fusiform shell, with plain, subacute axial ribs, and protractive growth-lines, which are strongly arcuate at the posterior part. Eleven ribs are on the penult whorl. $2\frac{3}{4}$ apical whorls are smooth and convex. There is no spiral striation except towards the end of the anterior part. The aperture is broken in both examples.

Length 26.8, greatest diam. 7 mm., $11\frac{1}{2}$ whorls.

Type and another specimen are no. 2924 A. N. S. P.

Mangilia dominicensis (Gabb) Plate XXXV, fig.1.

T. (Bela) dominicensis Gabb, Tr. Am. Philos. Soc. xv, 1873, p. 208.

The type specimen has about 13 axial ribs on the last whorl. Under sufficient magnification it shows close spiral lines of granules, every fourth line slightly larger. On the spire the whorls are strongly angular in the middle, but this angle weakens a good deal on the last whorl.

Length 5.5, diam. 1.75 mm., with $8\frac{1}{2}$ whorls, having lost one or two.

A young specimen in the lot shows $2\frac{3}{4}$ convex whorls forming the conic embryonic shell; these seem to be microscopically punctate. They are followed by $\frac{3}{4}$ of a whorl (nepionic) which is closely sculptured with protractive riblets.

Cythara heptagona (Gabb) Plate XVII, fig. 9.

Mangelia heptagona Gabb, Trans. Amer. Philos. Soc. xv, p. 211,
Cythara terminula Dall, Trans. Wagner Free Inst. Sci.III, pt. 1, 1889 p. 38, Pl. 2, fig. 5.

After $1\frac{1}{2}$ rounded apical whorls, there is a half whorl having numerous ribs. On subsequent whorls there are seven narrow, acute axial ribs, continuous from whorl to whorl. Fine, but clearly engraved spiral lines run over ribs and the broad concave valleys. The outer lip has a longitudinal callus inside below the posterior sinus.

Length 15, diam. 6.5 mm., 8 whorls.

The type and another specimen are no. 2915 A. N. S. P.

Specimens from the Pliocene of the Caloosahatchie River and Shell Creek seem to be specifically identical. They have 7, 8 or 9 longitudinal ribs.

Cythara polygona (Gabb) Plate XVII, fig. 10.

Mangelia polygona Gabb, Tr. Am. Philos. Soc. xv, 1873, p. 211.

The first 2 whorls are convex and smooth, the following half whorl multicostate. Following whorls are subangular below the middle, the angulation decreasing gradually to the penult, which is rounded. Last whorl has 15 narrow axial ribs. Spiral striation is fine and close.

Length 11, diam. 4.4 mm., $7\frac{1}{2}$ whorls (type, no. 2916 A. N. S. P.).

Other specimens of the type lot show varying numbers of ribs, from 11 to 18 on the last whorl. When numerous, the ribs are not continuous from whorl to whorl throughout. Another specimen is labelled Cibao Valley.

C. gibba Guppy, from the Oligocene of Jamaica (Proc. U. S. Nat.

Mus., XIX, 1896, p. 306, pl. 27, fig. 9.), seems to resemble closely the young of this species.

Cythara elongata (Gabb) Plate XVIII, fig. 6.

Mangelia elongata Gabb, Tr. Am. Philos. Soc. xv, 1873, p. 211; Journ. Acad. Nat. Sci. Phila. 2 Ser., viii, 1881, p. 351, pl. 46, fig. 31.

This species has 6 ribs, continuous from whorl to whorl. There is a group of faint spiral striae in the region of the anal fasciole, but none elsewhere on the last whorl. Gabb's figure is bad, the last whorl being represented as far too convex.

Length 7, diam. 2.3 mm.

The single specimen is no. 2917 A. N. S. P.

Cythara elevata (Gabb) Plate XVIII, fig. 3.

Mangelia elevata Gabb, Tr. Am. Philos. Soc. xv, 1873, p. 211.

This small species has $6\frac{1}{2}$ whorls, of which the first 3 comprise the embryonic shell. These whorls are smooth and convex until the last half-whorl, which has close, fine backwardly arched riblets. Subsequent whorls have slightly protractive rounded ribs, eleven on the penult whorl, rather high, and compressed below the sutures; in the lower half of each whorl crossed by three spiral threads in the intervals of which there are about three very low spirals. On the last whorl there are about 20 major spirals; they are closer anteriorly, where there are fewer of the low minor spirals, there being four in the upper intervals, down to one in the lower. The aperture is of nearly the same width throughout. Anal sinus rounded.

Length 6.3, diam. 2.5 mm.; 7 whorls.

Type is no. 3224 A. N. S. P. A single specimen.

Clathurella paupercula (Gabb) Plate XVIII, fig. 4.

Defrancia paupercula Gabb, Trans. Amer. Philos. Soc. xv, 1873, p. 209.

The sculpture is of close, small vertical folds which curve backward close below the suture, crossed by numerous spiral cords, 7 on the penult whorl below the fasciole, one cord above it. The anal sinus is oblique and moderately deep. Lip arches forward, and is strengthened by a rather strong, rounded varix.

Length 8.5, diam. 3.3 mm., about $4\frac{1}{2}$ whorls remain.

Type no. 2918 A. N. S. P.

Clathurella gracilis (Gabb) Plate XVI, fig. 10, 11.

Defrancia gracilis Gabb, Tr. Am. Philos. Soc., xv, 1873, p. 209.

On the penult whorl there are sixteen axial ribs, crossed by five or six narrow spiral cords; on the last whorl about eighteen narrow, spiral cords, which are slightly enlarged where they cross the ribs

and widely spaced in the peripheral region and above. Between them are many minute spirals and rather sharp axial striae (Plate XVI, fig. 11).

Length 28.5, diam. 7.5 mm., aperture 12.5 mm. long; 10 whorls (not 11 as stated by Gabb).

The type is no. 2914 A. N. S. P.

Clathurella amica Pils. and Johns. Plate XVII, fig. 13.

Proc. A. N. S. Phila., 1917, p. 158.

Glyphostoma dentiferum (Gabb) Plate XVII, fig. 15.

Glyphostoma dentifera Gabb, Proc. A., N. Sci. 1872, p. 971 [=271], pl. 11 fig. 4. (Feb. 11, 1873). Tr. Am. Philos. Soc. xv, 1873, p. 210.

Clathurella (*Glyphostoma*) *dentifera* (Hinds), Cossmann, Journ. de Conchyl. xi, 1913, p. 31, pl. 2, figs. 15-17,with var. *martinicensis* Cossm., figs 18-20.

Gabb's figure is not very good. The whorls of the spire have stout, short ribs or nodes at the periphery. On the penult whorl they become smaller and bifurcate below the shoulder, and the last whorl has numerous narrow ribs, part of them uniting by pairs at the shoulder. In the series of 9 individuals, there is very great variation in size and shape. It is possible that with further large series, an assortment into several species would be practicable, though this seems unlikely. The smallest one having a complete adult aperture is 14.5 mm. long, of 9 whorls. Others measure:

Length 32.4, diam. 13 mm.; $9\frac{1}{2}$ whorls (type).

Length 31 (estimated), diam. 10 mm.

Length 26.4, diam. 10 mm.; $10\frac{1}{2}$ whorls.

This is type of the genus *Glyphostoma*. It is certainly distinct from the recent *Clavatula dentifera* Hinds, but if that species is a *Glyphostoma*, as seems likely, the name *dentiferum* Gabb will have to be changed. Perhaps *martinicensis* Cossmann will be available; but the figures are imperfect and I am not sure that the forms are specifically identical.

Clavatula labiata Gabb. Plate XVII, figs. 11, 12.

Clavatula labiata Gabb, Trans. Amer. Phil. Soc. xv. 1873, p. 209. Guppy, Quart. Journ. Geol. Soc. 1876, p. 527, pl. 28, fig. 3.

This species has a mamillar embryonic shell of $1\frac{3}{4}$ whorls, the first rounded and very bulbous, though small, the last third of the last embryonic whorl becoming angular in the middle. After that the neanic sculpture appears abruptly, strong, protractive peripheral nodes crossed by fine, sharp, spiral threads. On the last whorl the spirals are hardly noticeable except near the base. The crenulations within the outer lip are short and sharp.

Length 20.5, diam. 9.9 mm.

The type is the largest of six specimens catalogued under no. 2928 A. N. S. P.

Scobinella magnifica (Gabb) Plate XVII, fig. 16.

Cordiera magnifica Gabb, Trans. Amer. Philos. Soc., xv, 1873, p. 210.

This beautiful species is much larger and more slender than *S. caelata* Conrad, of the Vicksburg Oligocene, which it resembles in sculpture. The columella has four plaits, which diminish downward from the upper one, as in *Mitra*.

Length 70.5, diam. 16.4, length of aperture 34.7 mm.; 12 whorls, those of the embryonic shell being lost.

Type is no. 2926 A. N. S. P.

A *Scobinella* has been described from Mindi, Canal Zone, under the name *Euchilodon morierei* Laville MS., by M. Cossmann.[18] It has a shorter anterior canal than either of the Santo Domingan species, and differs in some details of sculpture, but it evidently stands close to *S. tristis*. These species cannot belong to the genus *Eucheilodon*, which differs conspicuously by having a numerous series of ten or twelve short subequal transverse folds on the collumella, somewhat as in some Columbellas. In *Scobinella* the structure is like *Mitra*.

Scobinella tristis Pils. & Johns. Pl. XVII, figs. 17, 18.

Proc. A. N. S. Phila. 1917, p. 158.

Borsonia (Paraborsonia) varicosa (Sowerby) Plate XVII, figs. 19, 20, 21.

Mitra varicosa Sowerby, Q. J. Geol. Soc. vi, 1849, p. 46.
Cordiera varicosa Sby., Gabb, Trans. Amer. Philos. Soc. xv. p. 210.

A handsome, very elaborately sculptured species. The anal fasciole forms a strongly elevated band at the shoulder. This band is bilirate, the two cords tuberculate, the tuberles being connected across the interval. Below the shoulder there is a close sculpture of larger alternating with smaller spiral cords and threads crossed by close but very much interrupted axial threads, the intersections graniferous. Near the anterior end the axial sculpture disappears. Above the shoulder there are crowded, granose spirals. The rather small anal sinus is continued inward as a furrow. Below it are many sharp lirae within the lip. The columella has two strong plaits, the upper one larger and flat-topped. The lower plait is about midway between the ends of the inner margin. In half-grown individuals there is a third distinct plait, and in one the weak

[18] Journ. de Conchyl., LXI, 1913, p. 34, pl. 3, figs. 6, 7.

trace of a fourth may be seen. A complete shell should have about 9 whorls.

The embryonic shell consists of $1\frac{1}{2}$ smooth convex whorls, the summit a little obtuse.

Length 24, diam. 9.1, length of aperture 13 mm.

This species differs from *Borsonia*, as defined by M. Cossmann, by the large upper plait high on the columella, and the sinus at the shoulder, terminating an elevated anal fasciole; the sculpture otherwise much as in *Scobinella*. We propose for it the new subgenus *Paraborsonia*.

Rouaultia has the sinus in the same situation, but it differs widely in other characters.

Borsonia recurvirostris Gabb. Plate XVIII, fig. 2.

Borsonia recurvirostris Gabb, Tr. Am. Philos. Soc., xv, 1873, p. 210.

There are fourteen nodes on the periphery of the last whorl, below which are numerous, strongly unequal spiral cords and threads. On the whorls of the spire only three spirals are visible, the upper one being peripheral. Between the concave anal fasciole and the suture there is a prominent spiral ridge. The single columellar plait is strong and but little oblique.

Length 9.6, diam. 3.9 mm.; $8\frac{1}{3}$ whorls.

It probably belongs to the subgenus *Borsonella* Dall, though the sculpture is rather diverse.

The type is no. 2912 A. N. S. P.

CONIDAE.

Conus haytensis Sowerby. Plate XIX, fig. 1.

Conus haytensis Sowb., Quart. Journ. Geol. Soc. vi. 1849, p. 44.
Conus haitensis Sowb., Gabb, Tr. Amer. Philos. Soc. xv, 1872, p. 231 (in part).

The largest species of the genus in the Santo Domingan formation. The spire is conspicuously striated spirally; also the anterior part of the last whorl. These striae are not granulous. The base is less contracted than in *C. domingensis*.

Length 107, diam. 65 mm. (Fig. 1).

Length 91, diam. 55 mm.

Length 85, diam. 58 mm.

In some specimens the spire is very low or almost flat except for a central mucro.

Length 61.5, diam. 44 mm.

Length 54, diam. 32.5 mm.

Conus haytensis politispira n. subsp. Plate XIX, fig. 5.

Spiral striae on the spire are very faint or wanting, the surface being somewhat polished. It does not attain so large a size as the typical form.

Length 66, diam. 35 mm.

Type no. 2565 A. N. S. P.

Conus domingensis Sowerby. Plate XIX, fig. 7.

Conus domingensis Sowb., Q. J. Geol. Soc. vi, 1849, p. 45.

This was included by Gabb in *C. haytensis,* but it may be distinguished by the pyriform contour, distinctly contracted near the anterior end, and the usually more acute spire. Four or five of the upper whorls are conspicuously nodose. The spirals of the anterior half are more or less granulous. On comparing a good series of different ages with *C. symmetricus* we consider them quite distinct species.

Length 89.5, diam. 49 mm.

While abundant, it was not taken in such copious quantity as *C. haytensis.*

Conus recognitus Guppy. Plate XIX, fig. 2.

Conus solidus Sowerby, Quart. Journ. Geol. Soc. xv, 1849, p. 45. Guppy, Q. J. Geol. Soc. xxii, 1866, pl. 16, fig. 1. Not C. *solidus* Sowb., Thes. Conch. 1841, p. 580.

Conus pyriformis Reeve, Gabb, Tr. Amer. Philos. Soc. xv. 1872, p. 229. Not of Reeve, Conch. Icon. fig. 70.

Conus recognitus Guppy, Proc. Sci. Asso. Trinidad, 1867, p. 171; Geol. Mag. 1874, p. 409; Q. J. Geol. Soc. 1876, p. 527.

This species is undoubtedly close to the recent *C. pyriformis* Reeve from the west coast of Central America, which is probably a descendant. *C. recognitus* is quite readily distinguished by the small nodes on the spiral whorls being obsolete, or present only on three or four of the upper whorls, while in *C. pyriformis* they are prominent on at least seven. It is also less pyriform.

Length 70, diam. 41 mm.

Conus imitator Brown and Pilsbry.

Conus imitator B. and P., Proc. A. N. S. Phila. 1911, p. 342, pl. 23, fig. 2, 3.

The largest specimen of a series collected by Gabb is 67 mm. long. The shoulder of the last whorl is acutely angular in the adult stage, and the spire is lower than in *C. catenatus.* It is related to *C. planiliratus,* but is larger and smoother, and not contracted near the anterior end.

Conus stenostoma Sowerby. Plate XXI, fig. 1.

Conus stenostoma Sowb., Quart. Journ. Geol. Soc. Soc. xv, 1849, p. 44.

Conus stenostoma Sowb., Guppy, Quart. Journ. Geol. Soc. xxii, pl. 16, fig. 2.

Mr. Guppy's otherwise good figure does not show the marked retraction of the lines of growth at the shoulder, which is one of the important characters of *C. stenostoma.*

Length 74, diam. 40 mm.; a larger, imperfect shell has a diameter of 43 mm.

Conus furvoides Gabb. Plate XX, fig.1.

Conus furvoides Gabb. Tr. Amer. Philos. Soc. xv, 1873, p. 232.

A narrow species, having a prominent ridge projecting above the suture of the last 4 whorls. Spiral striae on the spire are wanting or very faint. There are a few weak spirals towards the base.

Length 51.5, diam. 24.5 mm.

Length 44.5, diam. 22.7 mm. Fig. 1. Type.

The type and eleven other specimens are included in no. 3576 A. N. S. P.

Conus furvoides brachys Pils. and Johns. Plate XX. fig. 3.

Proc. A. N. S. Phila., 1917, p. 158.

Conus catenatus Sowerby. Plate XXII, figs. 3, 4.

Conus catenatus Sby., Q. J. Soc. xv, 1849, p. 45, pl. 9. fig. 2.
Conus interstinctus Guppy, Q. J. Geol. Soc. xxii, 1866, p. 288, pl. 16, fig. 3.

This was originally described and figured from a very young example. It attains the size and has the form of *C. consobrinus*, but differs by lacking tubercles on the spire. The upper whorls have a smooth, sharp carina projecting above the sutures, becoming blunt on the last 2 or 3 whorls in adults. Above the angle there are very fine spiral striae. Lower half or more of the last whorl is spirally striate, some of the spirals bearing granules. Young shells have more granulose spirals, as usual in this genus.

Length 65, diam. 29. mm. Fig. 3.

Length 48, diam. 23.5 mm.

Length 28. diam. 13 mm. Young. Fig. 4.

Conus xenicus Pils. and Johns. Plate XX, figs. 11, 11*a*.

Proc. A. N. S. Phila., 1917. p. 159.

Conus symmetricus Sowerby. Plate XX, figs. 2, 2*a*, 2*b*.

Conus symmetricus Sowb., Q. J. Geol. Soc. VI., 1849, p. 44, pl. 9, fig. 1.

The spire is striate, as in *C. haytensis* but the early whorls are not nodose above the suture. The granulation occupies from one-third to the whole of the last whorl. Ordinarily there are several nearly smooth, smaller spiral threads between the beaded spirals, but in some examples these secondary threads are as large as the

primaries, and nearly all are beaded. The very large series also comprises specimens transitional in sculpture.

It is much smaller than *C. haytensis*, the maximum size seen having a length of 48.5, diam. 28.5 mm.

There is a different *Conus symmetricus* of Deshayes, Descr. Anim. s. Vert. Bassin Paris iii, 1866, p. 426, pl. 100, figs. 27, 28.

C. s. var. *semiobsoletus* Maury is not separable from *symmetricus*, being merely the mature stage. This is demonstrated by the very large series in the Gabb collection.

Conus aratus Gabb. Plate XX, fig. 4.

Conus aratus Gabb, Tr. Amer. Philos. Soc. xv, 1873, p. 232,.
Conus ornatus Gabb, Maury, Bull. Amer. Pal. v, p. 41.

This species resembles *C. haytensis* somewhat in form, but differs by having conspicuous, widely spaced spiral grooves on the lower two-thirds of the last whorl. These grooves are very sharply cut in half-grown shells; in the largest example some of them are a little less deeply cut. There are about 12 widely spaced grooves and an equal number of close ones near the anterior end. The spire has close and rather deep spiral striae, 4 or 5 on each whorl. The inner whorls are inconspicuously tuberculate above the suture. The growth-lines retract strongly at the shoulder, as in *C. stenostoma*, which is allied.

Length 63, diam. 34 mm. Type.

Length 38, diam. 23.5 mm. Immature.

Type and 7 others are no. 2572 A. N. S. P.

C. ornatus Gabb of Maury is the half grown stage of *C. aratus*.

Conus planiliratus Sowerby. Plate XX, figs. 6, 9,

Conus planiliratus Sowerby, Q. J. Geol. Soc. vi, 1849, p. 44. Guppy, Q. J. Geol. Soc., xxii, 1866, p. 287, pl. 16, fig. 7.
Conus regularis Sby., Gabb. Journ. A. N. S. Phila., viii, p. 359, pl. 46, figs. 45–48. Not of Sowerby.

Gabb misunderstood this species. What he called *C. planiliratus* is an undescribed species which will be called *C. perlepidus*.

C. planiliratus is an extremely variable shell in sculpture of the last whorl, but the shape and the sculpture of the spire are quite constant. In large specimens the spirals are weak on the upper half of the last whorl (fig. 9).

Length 42, diam. 21 mm. or smaller.

We agree with Guppy's determination of this species. He has figured a Jamaican specimen.

For *Conus planiliratus* G. B. Sowerby, Jr., Proc. Zool. Soc. Lond.

1870, p. 255, pl. 22, fig. 1, we propose the name *Conus maculospira* Pils. & Johns.

Conus perlepidus Pils. and Johns. Plate XX, fig. 5.

Proc. A. N. S. Phila., 1917, p. 159.

Conus consobrinus Sowerby . Plate XX, figs. 7, 7*a*, 7*b*.

Conus consobrinus Sowb. Q. J. Geol. Soc. vi, 1849, p. 45.

The high, straightly conic spire with coronated whorls is distinctive. In large specimens from one to two or rarely three latest whorls are without nodes. Spiral sculpture of the last whorl is variable and in adults generally restricted to the lower half. In some young specimens the last whorl is covered with spiral threads, partly granose. The posterior sinus of the aperture is very deep.

Length 56, diam. 25 mm.

Length 50, diam. 22.5 mm.

There is a large series of various ages in the Gabb collection. Also found in the Bowden formation, and in a modified form it existed into the Pliocene.

Conus consobrinus ultimus Pils. and Johns. Plate XX, fig. 8.

Proc. A. N. S. Phila., 1917, p. 160.

Pliocene of Costa Rica.

Conus gaza Johnson and Pilsbry.

Conus marginatus G. B. Sowerby, Quart. Journ. Geol. Soc. vi, 1849, p. 44. Guppy, Quart. Journ. Geol. Soc. xxxii, 1876, p. 528, pl. 29, fig. 5. Gabb, Tr. Amer. Philos. Soc. xv, 1873, p. 230. Not *Conus marginatus* J. de C. Sowerby, 1837.

Conus gaza J. and P. in Brown and Pilsbry, Proc. A. N. S. Phila. 1911, p. 342, pl. 23, figs. 2, 3.

The figured type and 8 other specimens are no. 2554 A. N. S. P.

Conus marginatus Sowerby, of Cossmann, Journal de Conchyliologie 1913, p. 44, pl. 3, figs 14, 15, is evidently another species. It may be called *Conus pseudomarginatus*.

Conus trisculptus Pils. and Johns. Plate XIX, fig. 6.

Proc. A. N. S. Phila., 1917 p. 160.

Conus longitudinalis Pils. and Johns. Plate XIX, fig. 4.

Proc. A. N. S. Phila., 1917, p. 160.

Conus strombiformis Gabb. Plate XXI, fig. 2.

Conus strombiformis Gabb, Tr. Am. Philos. Soc. xv, 1873, p. 232.

The upper part of the spire is regular, but the penultimate whorl, at its last third, begins to descend more rapidly, this continuing in the last whorl. The earliest whorls are worn, but the intermediate ones have low and obtuse but strong nodes, and no spiral striation.

The nodes become weaker on the penult whorl and almost disappear on the last. The last two whorls have the periphery unusually rounded for a *Conus*. There are about 9 coarse spiral cords near the anterior end.

Length 63, diam. 35.5 mm. Probably about 12 whorls.

Type no. 2571 A. N. S. P. A single example.

This shell has a rather abnormal appearance, but the sculpture of the spire is unlike other known cones of the same beds.

Conus yaquensis Gabb. Plate XXI, fig. 6.

Conus yaquensis Gabb, Tr. Amer. Philos. Soc. xv, 1873, p. 233,.

This cone resembles *C. proteus* closely in shape except that the the spire is lower, with much less concave outlines, the apical angle much wider. The spiral furrow below the suture is deeper. In color it is a "negative" of *C. proteus*, the spots being white, the intervals ferrugineous. This color affects the texture of the shell, the white spots resisting erosion. In one worn specimen there are spiral series of pits along the colored bands. The anterior third of the last whorl has a few narrow raised spirals.

Length 49, diam. 30 mm. Type.

Length 40, diam. 23 mm. Paratype.

The two specimens are no. 2547 A. N. S. P.

Conus mus Hwass.

Conus mus Hwass, Gabb, Tr. Amer. Philos. Soc. xv, 1873, p. 230.

Two specimens are catalogued under no. 2562 A. N. S. P.

Conus bonaczyi Gabb. Plate XIX, fig. 3.

Conus bonaczyi Gabb, Tr. Amer. Philos. Soc. xv, 1873, p. 233.

This small species has the whorls of the spire flattened, very slightly concave, and marked with arcuate radial striae only. Shoulder rounded; lateral outline convex except near the base, where it is contracted. There are 18 spiral riblets, much wider than the intervening grooves in the upper part, about equal to them in the lower. The riblets are slightly concave on top. The grooves have fine, close, sharp axial striae.

Length 21.5, diam. 12 mm.

Type no. 2551 A. N. S. P.

A specimen 15.3 mm. long has 20 spiral riblets. which are narrower than in the type.

Conus proteus Hwass.

The specimens agree well with recent shells in form and markings.

Conus proteus humerosus n. subsp. Plate XXI, fig. 4.

Some specimens in the lot of *proteus* have fewer spots, as noted by Gabb. In the one figured there are 6 spiral rows of spots on narrower continuous bands. In another there seem to be 7 such spotted bands, but the color is nearly obliterated. Both of these shells are very broad-shouldered; otherwise they agree with *C. proteus*.

Length 65 (apical whorls lost), diam. 45 mm. (Type, no. 2548).

Length 64, diam. 40.5 mm.

This cone agrees with *C. williamgabbi* Maury in general shape and dimensions, but the whorls of the spire are concave, without spiral threads, and there are no spirals in the lower part of the shell.

Conus simplicissimus Pils. and Johns. Plate XXI, fig. 3, 5.

Proc. A. N. S. Phila., 1917, p. 161.

Conus cercadensis Maury (*porcellus* Pils. and Johns.). Plate XX, fig. 10.

Proc. A. N. S. Phila., 1917, p. 161.

This is apparently synonymous with *C. cercadensis* Maury.

Conus pernodosus Pils. and Johns. Plate XXI, fig. 7.

Proc. A. N. S. Phila., 1917, p. 162.

Conus gabbi Pils. and Johns. Plate XXI, fig. 8, 9.

Conus gabbi Proc. A. N. S. Phila., 1917, p. 162.
Comus gracilissimus Guppy, Maury, Bull. Amer. Pal. v, p. 40.

In Bowden specimens of *Conus gracilissimus* the spiral cords are flattened and slightly wider than their intervals. In *C. gabbi* they are much narrower than the intervals and not at all flattened. This is not a matter of age. We have not seen the Bowden species from Santo Domingo.

Conus larvatus Pils. and Johns. Plate XXI, fig. 10.

Proc. A. N. S. Phila., 1917, p. 163.

CANCELLARIIDAE.

Cancellaria barretti Guppy.

Cancellaria reticulata Gabb, Tr. Am. Philos. Soc. xv, p. 236. Not of Linné.
Cancellaria barretti Guppy, Quart. Journ. Geol. Soc. xxii, 1866, p. 289, pl. 17, fig. 11.

While this species doubtless was the ancestral form of the recent *C. reticulata* (L.), it differs in several minor characters. The shell is thinner and the whorls of the spire are slightly more convex, giving the spire a less attenuated appearance; the reticulations are

much finer and more regular, while the varices are more prominent; the columellar plaits are smaller, the large upper one is thin and acute, showing no trace of bifurcation.

Cancellaria guppyi Gabb. Plate XXII, fig. 7.

Cancellaria guppyi Gabb, Tr. Am. Philos. Soc. xv, 1873, p. 236.

Similar to *C. barretti* in sculpture, but smaller and much thicker, the whorls more ventricose, the suture deep, narrowly channeled; plaits of the columella prominent, the large upper one bluntly bifid.

Length of the type figured 28, diam. 18.4 mm.

The type and seven other specimens are no. 2990 A. N. S. P.

Cancellaria rowelli Dall.

Cancellaria rowelli Dall, Proc. U. S. Nat. Mus. xix, 1896, p. 307, pl. 29, fig. 1.

Many specimens of this species were found associated with *C. barretti*. "It is perhaps most nearly related to *C. urceolata* Hinds, found living on the west coast of Middle America".

Cossmann's figures, Journ. de Conch. LXI, 1913, p. 53, pl. 4, fig. 5, 6, are probably not this species.

Cancellaria epistomifera Guppy. Plate XXII, fig. 13.

Cancellaria moorei Gabb, Tr. Am. Philos. Soc. xv, p. 236. Not of Guppy.
Cancellaria epistomifera Guppy, Quart. Journ. Geol. Soc., xxxii, 1876, p. 520, pl. 28, fig. 9.

Gabb erroneously referred this to *C. moorei* Guppy, a common species in the Bowden beds. A specimen is figured for comparison with *C. gabbiana*.

Cancellaria laevescens Guppy.

Cancellaria laevescens Guppy, Quart. Journ. Geol. Soc. xxii, 1866, p. 289, pl. 17, fig. 12.

This species resembles somewhat the recent *C. obesa* Sowb., from the west coast of Central America. The Santo Domingo specimens are a small, finely sculptured form of the species, length 28, diam. 17.8 mm.

Cancellaria ellipsis n. sp. Plate XXII, figs. 8, 9.

Cancellaria tessellata Sowerby, Gabb, Trans. Amer. Philos. Soc. xv, 1873, p. 236. Not of Sowerby.

The shell is small, oblong, with conic spire of nearly 6 whorls, of which the apparently smooth embryonic shell comprises $1\frac{1}{2}$. Subsequent whorls have an even cancellate sculpture of equally prominent axial riblets which are distinctly narrower than their intervals, and spiral cords equal to their interstices, the intersections raised. On the last whorl there are 24 spirals. The aperture is

somewhat oblique, narrow; outer lip obtuse, evenly arcuate, with marginal crenulations corresponding to external spirals, and a much smaller number of lirae (12) extending further within. The columella has two strong plaits and further out there are several oblong tubercles on its face. A thin callus spreads a short distance forward over the ventral face.

Length 12, diam. 6.7 mm.

Type and a second specimen no. 2909 A. N. S. P. Both are figured.

C. tessellata Sowerby, besides being a much larger shell, differs by the copious callous deposit which spreads over most of the ventral face of the last whorl, and the embryonic shell is larger. A specimen 27.3 m. long has nearly 7 whorls, of which about $2\frac{3}{4}$ belong to the embryonic stage.

Possibly this is a younger stage of *C. islacolonis* Maury, which has a more developed lip and a widely spreading callus in front. The two examples however appear to be adult.

Cancellaria gabbiana Pils. and Johns. Plate XXII, fig. 12.

Proc. A. N. S. Phila., 1917, p. 163.

The last whorl is shorter and the aperture broader than in *C. epistomifera*. There is a trace of the characteristic spout of the lip, but much less marked than in that abundant species. The axial ribs are fewer, more widely and less regularly spaced in *gabbiana*.

Cancellaria (Trigonostoma) insularis Pils. and Johns. Plate XXII, fig. 11.

Proc. A. N. S. Phila., 1917, p. 163.

After the $1\frac{1}{2}$ smooth embryonic whorls the sculpture begins abruptly; there are about 14 retractive ribs on the first neanic whorl, crossed by about 7 very much finer, spiral threads. The last whorl has two somewhat enlarged ribs or varices next behind the lip, and one but slightly prominent on the left side of the ventral face. There are no varices on the earlier whorls. The spiral sculpture of the last whorl is far less coarse than in *C. gurabis* Maury. There are no spirals in the sutural excavation.

While evidently related to *C. gurabis*, this differs in so many details that with present materials it appears to be distinct.

OLIVIDAE.

Oliva reticularis Lam.

The specimens which we refer to typical *O. reticularis* are readily separated from *O. cylindrica*, in the large series at hand.

Oliva cylindrica Sowerby. Plate XXIII, figs. 2, 3.

Oliva cylindrica Sowerby, Q. J. Geol. Soc. vi, 1849, p. 45.
Oliva giraudi Cossmann, Journ. de Conchyl., lxi, 1913, p. 56, pl. 5, figs. 1, 6–8 (Martinique), figs. 4, 5, (Saint-Domingue.)

This abundant Olive is distinguishable from *O. reticularis* by the wider, more cylindric form, the lower spire composed of *flat* (not concave) whorls. The shape is much more like *Oliva splendidula* Sowb., of the west coast of Central America.

There is the usual variation in height of the spire and degree of concavity of its outlines, such as occurs in most species of *Oliva*.

Length 52, diam. 25 mm. (Pl. XXIII, fig. 2). The largest specimen of a very long series is 60.5 mm. long.

M. Cossmann has figured a quite small specimen from Santo Domingo, under the name *Oliva giraudi*, but which appears to us indistinguishable from *O. cylindrica* except by its smaller size. The length he gives for the species, 93 mm. is probably an error for 33 mm.

Oliva proavia Pils. and Johns. Plate XXIII, fig. 1.

Proc. A. N. S. Phila., 1917, p. 164.

This fine Olive requires comparison with *O. cristobalcoloni* Maury, which may prove to be an immature specimen of the same species. It is relatively broader, with a differently shaped spire and more fully developed plaits on the inner lip.

Oliva brevispira Gabb. Plate XXIII, fig. 4.

Oliva brevispira Gabb, Tr. Am. Philos. Soc. xv, 1873, p. 215.

This species resembles *O. reticularis* in form, but is distinguished from other Tertiary and recent species of the region by its very short spire. The greatest width is above the middle. About 30 small plaits are on the inner lip. These are somewhat unequal and unevenly spaced, some being spaced by pairs. The siphonal fasciole is strongly oblique, its upper ledge entering above the middle of the inner lip.

Length 34.5, diam. 14 mm., length of aperture, measured to the suture, 30 mm.

The type, no. 2997 A. N. S. P., is somewhat worn, and none of the six examples is quite perfect. By the shape of the columella it has some resemblance to *O. nebulosa* Lam. *O. brevispira* of Maury is a different species.

Oliva gradata Gabb. Plate XXIII, figs. 10, 11.

Oliva gradata Gabb, Tr. Am. Philos. Soc. xv, 1873, p. 215.

The special character of this species is that there is a sharp though

slight off-set or ledge encircling the last whorl a short distance (nearly 3 mm.) below the suture. On the whorls of the spire this is concealed by a smooth callus deposit over the inter-sutural space. The spire is straightly conic up to the nipple-like 2 or 3 apical whorls. The inner lip has about 15 strong, evenly spaced plaits.

Length 28.5, diam. 12 mm.; aperture, measured to suture, 20 mm.

The type, with two slightly smaller specimens, is no. 2998 A. N. S. P

Oliva dimidiata Pils. and Johns. Plate XXIII, fig. 8.

Proc. A. N. S. Phila., 1917, p. 165.

Olivella muticoides (Gabb) Plate XXIII, figs. 5, 6, 7.

Oliva muticoides Gabb, Tr. Am. Philos. Soc., xv, 1873, p. 215.
Oliva canaliculata Gabb, *tom. cit.* p. 215. Not of H. C. Lea.

Gabb's two descriptions apply to the high- and low-spired extremes of a single species. The large series before us contains completely transitional examples.

A thick labial callus extends from the basal fasciole to the suture, its abrupt edge straight and parallel with the lip.

Length 19.8, diam. 8 mm., length of aperture 13 mm. (type of *multicoides*).

Length 18, diam. 8.5 mm., length of aperture 13.3 mm. (type of *canaliculata*).

Of the three specimens figured, fig. 7 represents the type of *muticoides* fig. 6 a transitional example, and fig. 5 the type of *canaliculata*.

The type and two other specimens of *O. muticoides* are no. 2805 A. N. S. P.; the type of *O. canaliculata* is no. 2806 A. N. S. P.; numerous other specimens.

Olivella floralia (Duclos)

Olivella oryza Lam., Gabb, Tr. Am. Philos. Soc. xv, 1873, p. 215.
Olivella indivisa Guppy, Proc. U. S. Nat. Mus. XLX, 1896, p. 308, pl. 30, fig. 10.

We can find no character to distinguish this from the recent species of the same region.

Olivella mutica (Say)

Oliva mutica Say, Journ. Acad. Nat. Sci. Phila., ii, 1822, p. 22.
Voluta nitidula Dillwyn, in part, and of authors; not of Deshayes, 1837.

Several specimens agree in every way with the recent form. *Voluta nitidula* Dillwyn was a composite species, including *mutica* Say and *O. pusilla* Marratt. If the name is used at all, we suggest that it be taken for *O. pusilla*.

Olivella nivea (Gmelin).

One specimen is referable to this recent species.

Olivella rosalina (Duclos).

Two specimens having entirely the form of this recent species.

HARPIDAE.

Harpa americana n. sp. Plate XXIII, fig. 13.

H. rosea Lam., Gabb, Tr. Am. Philos. Soc. xv, p. 214.

The shell is ovate, of about 6 whorls, of which three smooth ones form the nipple-shaped embryonic shell, the last whorl of which, together with part of the first sculptured whorl, are very narrow. The last whorl has about eleven low and narrow axial ribs which rise into small spines where they pass over the angle bounding a narrow flattening below the suture. The whole surface below this angle is spirally striate, the striation strongest in the concavity of the sides below. The aperture is narrow for this genus. A thin callus spreads forward over the ventral convexity.

Length 33.3, diam. 28.6 mm.

This form is very similar to the recent *Harpa rosea* Lam. (*H. doris* Bolt.), but specimens of that species of the same size have more ribs and a wider aperture.

Type no. 4061 A. N. S. P.

MARGINELLIDAE.

Marginella sowerbyi Gabb. Plate XXIII, fig. 14.

Marginella sowerbyi Gabb, Tr. Am. Philos. Soc. xv, 1873, p. 221.

A markedly biconic species. The second and third columellar plaits have flattened and slightly furrowed summits, the fourth being flattened.

Length 14.5, diam. 8.1, length of aperture 10.5 mm.

A much smaller example, length 8.2 mm., with the type, shows traces of coloration. There are 5 spiral zones, the upper, middle and lower vertically lineolate with white, the other two having spotted borders and uniform median bands.

Type no. 2498 A. N. S. P.

Marginella nugax Pils. and Johns. Plate XXIV, fig. 14.

Proc. A. N. S. Phila., 1917, p. 165.

Marginella coniformis Sowerby.

Marginella coniformis Sowb., Q. J. Geol. Soc. vi, 1849, p. 45. Guppy, *l. c.* xxii, 1866, p. 288, pl. 17, fig. 2. Dall, Proc. U. S. Nat. Mus. xix, 1896, p. 309.

Several specimens. Guppy's figure is very poor, even for a Jamaica specimen. As a rule these are somewhat narrower than shells from Santo Domingo. It seems very close to, if not identical with, *M. aurora* Dall, from the Oligocene bed of the Chipola River; but we have not been able to compare specimens of the latter.

Marginella domingoensis Dall.

Marginella domingoensis Dall, Proc. U. S. Nat. Mus. xix, 310, 1896.

Four specimens we refer to this species. Dr. Dall writes: "This species is close to *M. aurora* Dall, from the Chipola marl, but has the tip of the spire less conspicuous and the aperture quite flexuous instead of nearly straight." Length 24 mm., greatest diam. 14 mm.

Marginella cercadensis Maury.

Marginella chrysomelina Gabb, Tr. Am. Philos. Soc. xv, 1873, p. 221.

Four specimens, no. 3269. On two, traces of the spiral color lines may be seen.

Marginella latissima Dall.

Marginella latissima Dall, Proc. U. S. Nat. Mus. xix, 1896, p. 308, pl. 29, fig. 11.

The specimens of this species from Santo Domingo represent a great range of variation, but with many before us it seems impossible to assort them except by sizes. Gabb referred these doubtfully to *M. apicina* on the label, but he did not mention the species in his work.

Marginella amina Dall.

Marginella amina Dall, Proc. U. S. Nat. Mus. xix, 1896, p. 309, pl. 29, fig. 15.

Two specimens are labeled in Gabb's handwriting "*M. antiqua* Redfield", but they are not mentioned in his work.

VOLUTIDAE.

Lyria pulchella (Sowerby)

Voluta pulchella Sowerby, Q. J. Geol. Soc., vi, 1849, p. 46, pl. 9, fig. 4.
Lyria pulchella Sby., Gabb, Tr. Am. Philos. Soc., xv. p. 219.
Lyria pulchella Sby., Dall, Bull. U. S. Nat. Mus. No. 90, p. 58, pl. 10, fig. 11.

Sowerby has given a good figure of this species. In some specimens the axial ribs become obsolete on the last whorl.

Lyria mississippiensis (Conr.) of the Vicksburg Oligocene is a closely related form. Dr. Dall has recorded *L. pulchella* from the silex beds at Ballast Point, Florida.

Lyria soror (Sowerby) Plate XXIV, figs 11, 12.

Voluta soror Sowerby, Q. J. Geol. Soc. vi, 1849, p. 46.

The axial ribs are somewhat flexuous and much more delicate

than in *L. pulchella*; the anterior spirals are stronger; finally the apical whorls differ. In *L. pulchella* there are $1\frac{1}{2}$ smooth whorls, the first one globose and bulging, the second narrower. In *L. soror* the summit is smaller, the whorls increasing regularly, and there are $1\frac{3}{4}$ smooth ones. These differences certainly indicate specific divergence.

Aurinia striata (Gabb) Plate XXIII, fig. 9.

Scapha striata Gabb, Tr. Am. Philos. Soc., xv, 1873, p. 219.
Scaphella (Aurinia) striata Gabb, Dall, Trans. Wagn. Inst. iii, 1890, p. 88.

The rounded summit ($\frac{3}{4}$ of a whorl) is worn; after that all of the whorls are closely striate spirally. The first $2\frac{3}{4}$ whorls have a subcylindric shape; then small nodules appear above the middle, which becomes subangular. The last whorl has a prominent rounded ridge at the shoulder, closely set with about 22 compressed nodes. Two columellar plaits remain on the type, which is broken anteriorly. In a very young one there are three.

Length as broken 25, diam. 11.5 mm. Nearly 5 whorls.

Gabb's type, no. 3274 A. N. S. P., is a young shell; another 13 mm. long was taken. The consideration of the species by Dall referred to above, should be consulted.

MITRIDAE.

Mitra henekeni Sowerby.

Mitra henikeri Sowerby, Q. J. Geol. Soc., vi, p. 46, 1849, pl. 9, fig. 5.

Adult specimens have but two columellar plaits, with sometimes the very weak trace of a third; in young specimens the third plait is more distinct. Sowerby's illustration is good, though the specimen was incomplete.

M. henekeni resembles the following species, but it is less slender, the whorls are more convex, and are acutely carinate below the channelled suture.

Length 58, diam. 15 mm. Broken specimens indicate that it reaches a length of about 65 mm.

Mitra longa Gabb. Plate XXIV, fig. 3.

Mitra longa Gabb, Tr. Am. Philos. Soc. xv, 1873, p. 219. Brown and Pilsbry, Proc. A. N. S. Phila. 1911, p. 346, pl. 24, fig. 11.

A very slender shell with three well-developed columellar plaits and traces of two more. The acute spiral cords alternate with smaller ones, the intervals having some spiral threads, more numerous near the base. The intervals are crossed by even, fine axial threads.

Length 61.3, diam. 13.6 mm. The largest one is somewhat broken, but evidently had a length of about 75 mm.

Type and 12 other specimens are no. 3263 A. N. S. P.

Mitra titan Gabb. Plate XXIV, figs 1, 2.

Mitra titan Gabb, Trans. Amer. Phil. Soc. xv, 1873, p. 220.
Mitra symmetrica Gabb, *l. c.*

This large species reminds one of *M. millingtoni* Conr., from the Jacksonian Eocene, but has finer revolving and more prominent longitudinal lines, it is also somewhat wider in proportion to its length.

The adult stage is represented by one specimen, broken at both ends (Pl. XXIV, fig. 2), in its mutilated condition measuring, length 106.3, diam 43 mm. The spire shows fine spirals, every fourth one deeper; tapering base densely striate spirally, the peripheral region of the last whorl being smooth. In the young stage, represented by Gabb's *Mitra symmetrica* (Pl. XXIV, fig. 1), the whole surface is closely sculptured with spiral cords, on the upper part of the last whorl alternating with smaller threads; the intervals being beautifully sculptured with very fine axial threads as in *M. longa*. Length of *M. symmetrica* 51.2, diam. 13.8 mm. The types of both *M. titan* and *M. symmetrica* show four columellar plaits, the lower one small and hardly visible in a front view.

Five specimens around 50 to 80 mm. long, afford the stages connecting *symmetrica* and *titan*.

Type of *M. titan* no. 3261 A. N. S. P. 5 smaller specimens are contained in no. 3267.

Type of *M. symmetrica* no. 3260 A. N. S. P.

Mitra rudis Gabb. Plate XXIV, figs. 4, 5.

Mitra rudis Gabb, Tr. Am. Philos. Soc. xv, 1873, p. 220.
Mitra quemadica Maury, Bull. Amer. Pal. v, p. 75.

The last whorl has about nineteen low, rounded, spiral cords, five of which are visible on the whorls of the spire. These are crossed and made subgranular by very irregular, subobsolete, axial wrinkles or growth lines. In the adolescent shell there are raised threads across the intervals, which appear pitted. Between the upper spiral cord and the next, there is a wider interval.

Length (summit broken) 31.3, diam. 13.8 mm.

Type is no. 3262 A. N. S. P., with 5 smaller examples.

Mitra granulosa Lamarck.

We refer a young specimen 18 mm. long to this recent species.

Mitra barbadensis (Gmelin)

The single specimen is rather worn, but agrees well with recent specimens.

Mitra mesolia Pils. and Johns. Plate XXIV, fig. 10.

Proc. A. N. S. Phila., 1917, p. 166.

Vexillum tortuosellum (Pils. and Johns.) Plate XXIV, fig. 9.

Mitra tortuosella Pils. and Johns., Proc. A. N. S. Phila. 1917, p. 165.

Vexillum tortuosellum frater (Pils. and Johns.) Plate XXIV, fig. 13.

Mitra tortuosella frater Pils. and Johns., Proc. A. N. S. Phila. 1917, p. 166.

Vexillum tortuosum (Gabb) Plate XXIV, fig. 8.

Mitra tortuosa Gabb, Tr. Am. Philos. Soc., xv, 1873, p. 220.

There are about fifteen sharp, axial ribs on the last, eleven or twelve on the penult whorl. Between them are many impressed spiral lines, eleven or twelve on the penult whorl, parted by convex intervals which become spiral cords towards the anterior end of the shell, the axial ribs disappearing there. There are four columellar plaits, and the outer lip is closely lirate within.

Length 32.3, diam. 11.5 mm.

Type and 4 other specimens are no. 3284 A. N. S. P.

Plochelæa crassilabrum Gabb. Plate XXIV, fig. 6.

Plochelæa crassilabra Gabb, Proc. A. N. S. Phila. 1872, p. 272, pl. 11, fig. 5 (Feb. 11, 1873)

Plochelæa crassilabrum Gabb, Tr. Am. Philos. Soc. xv, 1873, p. 216.

The shell is smooth, oblong, widest above the middle, solid; spire straightly conic; suture scarcely impressed, ascending in front. Last whorl swollen above, the anterior two-thirds slowly tapering: terminating in a massive but low and rounded varix. The aperture is sinuous, the upper half narrow, lower half dilated; lip thick, blunt, the outer margin inflected, widest in the middle, dilated near the base. Anterior canal deep. Columella crossed by an emerging callus which is thickened in the lower half; bearing five low, rounded, parallel and contiguous entering plaits, the third one slightly the strongest.

Length 44.2, diam. 19.8 mm. Length of aperture measured from base to the end of the suture, 35.4 mm.

The type, represented by Gabb's figure and ours, is no. 3289 A. N. S. P. The eroded seat of an *Hipponix* scars the spire. In his later specific description, Gabb confused this species with the following one; his measurement and the phrase relating to the columellar plaits relating to the latter.

The spire is somewhat worn above, so that the number of whorls is uncertain.

The genus *Plochelæa* Gabb belongs, no doubt, to the Mitridae. It stands close to, if not to be united with, the genus *Mutyca* H. & A. Adams, 1853, type *M. ancillides* Swains., with which *Mitroidea* Pease 1865, (type *M. multiplicata* Pse.), and *Mauritia* H. Adams, 1869, type *M. barclayi* H. Ad., are to be united as synonyms or sections. *Dibaphus* Philippi (1847), is another allied genus. With a knowledge of the above mentioned genera it seems strange that Gabb referred *Plochelæa* to the Olividae.

The type of *Plochelæa* is *P. crassilabrum* Gabb.

Plochelæa gabbi Pils. and Johns. Plate. XXIV, fig. 7.

Proc. A. N. S. Phila., 1917, p. 166.

XANCIDAE.

Turbinellidae of authors.

The replacement of the name *Turbinella* by *Xancus* is one of the outrages against scientific nomenclature consequent upon the adoption of Bolten's *Museum* as a source of generic and specific names. The disappearance of the name *Turbinella* necessitates alteration of the family name.

This family is remarkably well developed in the Santo Domingo beds.

Xancus rex Pils. and Johns. Plate XXVI, figs. 5, 8.

Proc. A. N. S. Phila., 1917, p. 167.

The spire is longer than usual in *X. scolymus*, not shorter as stated in the original description. The inner lip often has the callus detached at the edge. The size of adults varies a good deal.

It is an abundant species, mistaken for *X. validus* by Gabb, Maury and others.

Xancus validus (Sowerby) Plate XXV, fig. 3.

Turbinellus validus Sowb., Q. J. Geol. Soc. vi, 1849, p. 50. Not of Gabb or Maury.

This species has been misunderstood by Gabb and Maury, owing to Sowerby's qualified comparison with *Turbinella scolymus*. The original description, however, is good, and the comparison not strained when one remembers that in 1849 *Turbinella* comprised also *Vasum*, *Latirus* and other genera.

The shell is obesely fusiform, ponderous. The embryonic stage is unknown, but the early and middle neanic whorls have thick,

rounded axial folds, weak below the suture, 6 or 7 on a whorl, and fine axial costulation, over which about 8 rather acute, narrow spiral threads run. On the last 2 or 3 whorls the axial folds are replaced by small, rounded tubercles disposed along a slight shoulder angle; the spirals become weak and sparse except towards the base. The suture is rather narrowly, deeply channelled. At resting stages and the final lip the suture rises very little. There are three strong plaits, the anterior one lowest and thickest. The largest shell measures 176 mm. long, 80 wide. This species differs from *X. rex* "in its tubercles, which are small and rounded," and the less emphatic sculpture generally.

X. validus differs from *Turbinella ovoidea* Kiener by the channelled suture and the more prominent axial folds of the spire. *T. regina* Heilpr. is more elongate than *X. validus* at all stages of growth. *T. scolymoides* Dall has more elaborate sculpture, the axial folds persisting longer, and the columellar plaits are smaller. *T. wilsoni* Conr. is more shouldered, with larger nodes. *T. polygonata* Heilpr. seems to resemble *T. wilsoni* rather closely, but no good adult specimens have been found.

Fasciolaria textilis Guppy[19] is less excavated below the periphery than the present species, but a form of the Bowden bed which we had provisionally called *Xancus textilis jamaicensis* (Pl XXV, figs. 5, 6) is rather closely related. It has conspicuous axial wrinkles above the shoulder, which is more developed and has larger nodes than *X. validus*. The first whorl following the embryonic stage has about twice as many axial folds as the succeeding whorls, and the suture is not in the least channelled.

A variety of *X. validus* with somewhat larger nodes at the shoulder was taken by Mr. L. B. Smith west of Azua, Haiti..

Xancus præovoideus Maury.

Turbinella ovoidea Gabb, Trans. Amer. Philos. Soc. xv, p. 218; not *T. ovoidea* Kiener, 1840.
Xancus proævoideus Maury, Bull. Amer. Pal. v, p. 83.
Xancus prævoideus Maury. op. cit. p. 241.

This fine shell, which Gabb collected in considerable quantity, differs from the recent *X. ovoideus* by the strong sculpture of the neanic whorls, as Miss Maury has pointed out. It reaches a length of 175 to about 200 mm. The suture usually rises abruptly at resting stages and behind the final peristome.

It differs from *X. validus* by the smoother later whorls. In a

[19] Geol. Mag. 1874, p. 140, pl. 16, fig. 5.

few specimens weak traces of the shoulder tubercles can be seen, suggesting a transition to *X. validus*, which has exactly the same early sculpture; but no evidence of an actual intergradation is at hand.

Vasum dominicense Gabb Plate XXVII, figs. 4, 5.

Vasum dominicensis Gabb, Tr. Am. Philos. Soc., xv, 1873, p. 218.

Closely related to the recent *V. capitellum* (L.), but the shoulder is less developed. There are eight obtuse, massive folds on the last whorl, the intervals clathrate. The outer lip is rather weakly lirate within and the columella has three rather small plaits.

Length 60, diam. 37.5 mm. Type, fig. 5.

Length 32, diam. 19 mm. Fig. 4.

Type and a smaller shell are no. 2623 A. N. S. P.

Vasum haitense (Sowerby)

Turbinella haitensis Sowerby, Q. J. Geol. Soc., vi, p. 50. Guppy, Q. J. Geol. Soc. xxxii, 1876, p. 523, pl. 29, fig. 3.
Vasum haitense Sowb., Gabb, Tr. Am. Philos. Soc. xv, p. 218.

Twelve specimens. It becomes very large and ponderous.

Vasum tuberculatum Gabb. Plate XXVII, figs. 2, 3.

Vasum tuberculatum Gabb, Tr. Am. Philos. Soc., xv, 1873, p. 218.

This species is very distinct from *V. haitense*, and in fact from all others known to us. The spire is much higher than in *haitense*. Seven very large tubercles on the shoulder of the last whorl are bifid at their summits, a swelling being superposed below the crest. The inferior tubercular ridge is somewhat smaller than in *haitense*, and there are slightly tubercular, very much smaller ridges above and below it. Five weak columellar plaits.

Length 112, greatest diam. 87 mm.

Type is no. 2624 A. N. S. P.

Vasum edificatum (Guppy)

Turbinellus edificatus Guppy, Q. J. Geol. Soc., xxxii, 1876, p. 523, pl. 28, fig. 5.
Vasum subcapitellum Heilprin, Trans. Wagner Free Inst. Sci., i, 188, p. 109, pl. 15, fig. 44. Dall, same Trans., iii, 1890, p. 99, pl. 4, fig. 12.
?*Vasum dominicense* Gabb, var. *gurabicum* Maury, Bull. Amer. Pal. v, p. 84.

Vasum subcapitellum, from the Oligocene of Ballast Point, differs only in being somewhat smaller than Santo Domingo specimens.

The neanic stage is rather profusely spinose. Guppy's figure shows the much less spinose adult stage.

Vasum pugnus Pils. and Johns. Plate XXVII, fig. 1.

Proc. A. N. S. Phila., 1917, p. 167.

FASCIOLARIIDAE.

Leucozonia rhomboidea (Gabb) Plate XXVI, fig. 9.

Lagena rhomboidea Gabb, Tr. Am. Philos. Soc. xv, 1873, p. 218.

The first whorl is globose with a depressed tip; $1\frac{1}{2}$ smooth whorls form the embryonic shell. The following whorl has axial folds and spiral threads, the folds weakening and finally disappearing on the succeeding whorls, but persisting as low, rounded peripheral nodes on part of the last whorl. The narrow furrow encircling the base has raised edges in the latter part. Outer lip is lirate within. There are three small columellar plaits.

Length 13.6, diam. 8 mm.; $6\frac{1}{3}$ whorls.

It is probably ancestral to the recent *L. cingulifera*.

Type and a smaller specimen are no. 2947 A. N. S. P.

Latirus infundibulum (Gmel.)

Gabb, Tr. Amer. Philos. Soc. xv, p. 27.

Four specimens. The secondary spirals are a little more developed than in recent shells.

Latirus brevicaudatus santodomingensis n. subsp. Plate XXV, fig. 4.

Differs from recent *L. brevicaudatus* by the smaller, more numerous primary spiral cords. On the convexity of the later whorls secondary spiral threads occupy the intervals, and on the last part of the last whorl there are some threads of the third order.

Length 57, diam. 24.5 mm.

Type is no. 2952 A. N. S. P.

Latirus fusiformis Gabb. Plate XXVI, figs. 2, 3.

Latirus fusiformis Gabb, Tr. Amer. Philos. Soc., xv. p. 217.

Smaller and more slender than *L. infundibulum*, with narrower and more numerous axial folds, rather abruptly terminated above, nine on the last whorl. The spiral cords are also smaller. There are some rather widely spaced, unequally grouped and irregular axial lamellae below the suture.

Length 31.5, diam. 12 mm.

Type no. 2954 A. N. S. P.

Latirus elongatus Gabb. Plate XXVI, fig. 4.

Tr. Amer. Philos. Soc. xv, 1873, p. 217.

This species is distinguished by its unually long anterior canal. The penult whorl has ten, last whorl nine axial folds. Spiral cords are small above, larger and more spaced on the canal. Only the last two whorls of the type are preserved. As broken the specimen measures:

Length 49.5, diam. 17.5 mm.

Type no. 2955 A. N. S. P.

Latirus angustatus Gabb. Plate XXVI, fig. 1.

Latirus angustatus Gabb, Tr. Am. Philos. Soc. xv, 1873, p. 217.

The single specimen, in poor preservation, differs from *L. elongatus* by the greater number of axial folds, 11 on the last whorl. There are some very weak lirae within the outer lip, the lower ones broken into granules, as in *L. elongatus*. We suspect that *augustatus* is merely a young *elongatus*.

Length 27 mm (spire and canal broken), diam.11 mm.

Type no. 2950 A. N. S. P.

Latirofusus exilis (Gabb) Plate XXV, fig. 1.

Latirus exilis Gabb, Tr. Am. Philos. Soc. xv, 1873, p. 217.

The last whorl has five broad, rounded axial folds, which extend upon the narrow anterior part. Whorls of the spire with four spiral cords, the lower partly concealed in the suture. There are four acute lirae within the outer lip, and two small, subhorizontal plaits on the columella.

Length 31.4, diam. 9.3 mm.

This is a typical species of *Latirofusus* Cossmann. The genus is represented in the American Oligocene (Vicksburg) by *L. perexilis* (*Cordieria perexilis* Conrad), and in the Eocene (Lower Claiborne) by *L. harrisi* Johns., (which proves to be a synonym of *L. perexilis*), and *L. obtusa* Johns.; in the Jackson bed by *L. leaënsis* Harris.

Type no. 2948 A. N. S. P.

Fasciolaria kempi Maury.

Fasciolaria intermedia Sby., Gabb, Tr. Am. Philos. Soc. xv, p. 217.

In some specimens the last whorl has a rounded shoulder, without tubercles. In others the tubercles extend to the lip. Up to 12 cm. long.

Fasciolaria semistriata Sowerby.

Fasciolaria semistriata Sowerby, Q. J. Geol. Soc. vi, 1849, p. 49.
Fasciolaria semistriata Sowb., Guppy Q. J. Geol. Soc. xxii, 1866, p. 288, pl. 16, fig. 12.
Fasciolaria semistriata Sowb., Gabb, Tr. Am. Philos. Soc. xv, 1873, p. 216.
Fasciolaria intermedia Sowerby, Q. J. Geol. Soc. vi, 1849, p. 49.

The great convexity of the whorls and the concavity below the suture are characteristic. It seems to have had dark spiral lines, like *F. distans*, with sculpture more like *F. tulipa*. Anterior canal is very long and slender. The early neanic whorls have low axial folds and spiral striae. Length 104 mm.

Fusinus haitensis (Sowerby)

Fusus haitensis Sowerby, Q. J. Geol. Soc., vi. 1849, p. 47.
Fusus henekeni var. *haitensis* Guppy, Q. J. Geol. Soc., xxii, pp. 524, 532, pl. 28, fig. 2.

One broken specimen and two young ones with subangular whorls are referred to this species. Without more material we cannot say whether it is distinct from *F. henekeni* or a variety thereof.

Fusinus henekeni (Sowerby) Plate XXVI, figs. 6, 7.

Fusus henikeri Sowerby, Q. J. Geol. Soc. vi, 1849, p. 49.
Fusus henekeni Sowb., Gabb, Tr. Am. Philos. Soc. xv, 1873, p. 204.
Fusus henekeni Guppy, Q. J. Geol Soc. xxxii, 1876, p. 524, pl. 28, fig. 6.

The figure given by Guppy is poor; the whorls should be more convex, and the spiral ridges larger and less numerous, there being only six or seven visible an the whorls of the spire. Many of the specimens show alternating spiral ridges on the larger whorls. Sowerby does not mention this character, but as Guppy's figure shows it indistinctly, we would consider the form with alternating sculpture to be typical.

It probably represents the ancestral form of *F. eucosmius* Dall, now living in 27–73 fathoms in the Gulf of Mexico and West Indies.

Length of the form with subequal spirals 71, diam. 22 mm. A specimen with prominent alternating spirals on the two large whorls (obsolete on the next earlier) measures length 89, diam. 26 mm.

It appears to be an abundant species.

Melongena (?). **antillarum** (Gabb) Plate XXVIII, figs. 10, 17.

Hemifusus antillarum Gabb, Tr. Am. Philos. Soc. xv, 1873, p. 204.

The largest cotype (fig. 17) has lost all of the spire, the last whorl measuring, length 79, diam. 49.5 mm., aperture 63 mm. There is a small ridge in the position of the inferior spine-series of the recent Gulf species of *Melongena*. The strongly lirate interior is a prominent feature. The smaller cotype (fig. 10) is a young shell 43.6 mm. long.

A fragment of the canal indicates a size somewhat exceeding the larger specimen. Two cotypes, with an additional fragment, no. 2797 A. N. S. P.

Melongena consors (Sowerby)

Pyrula consors Sowb., Q. J. Geol. Soc. vi, 1849, p. 49.
Melongena melongena L., Gabb, Tr. Am. Philos. Soc. xv, p. 205.

Very closely related to *M. melongena*, but differing by having strong spiral striation in the adult stage. It is also more ponderous. The height of the spire varies a good deal. The variations in the

spines are the same as in *M. melongena*. The largest in the series is about 15 cm. long.

The early neanic stage is unarmed as in *M. melongena*, and sometimes it is lirate within the aperture.

A single specimen with all the appearance of an adult is only 36 mm. long (no. 2798 A. N. S. P.). It is probably a dwarf, comparable to the well known dwarf form of *M. corona*, inhabiting inlets probably deficient in salinity. (Pl. XXXI, fig. 5)

Melongena orthacantha Pils. and Johns. Plate XXVIII, figs. 13-16.

Proc. A. N. S. Phila., 1917, p. 168.

Nassaria corrugata (Gabb) Plate XXII, fig. 15 (*N. brevis*).

Muricidea corrugata Gabb, Tr. Am. Philos. Soc. xv, 1873, p. 203.
Nassaria brevis Gabb, Tr. Am. Philos. Soc. xv, 1873, p. 213.

The characters of the types of these species are the same except that *brevis* is larger. The latter has a rather bulbous embryonic shell of $1\frac{1}{2}$ smooth whorls. The following $\frac{1}{3}$ whorl has numerous narrow axial ribs, after which there are strong, evenly spaced axial folds, 9 on the last whorl. These are traversed by acute spiral cords, of which there are six on the penult whorl, with minor threads in two or three of the intervals. The two cords above the suture are small, following two at periphery larger. The mouth is strongly lirate within, and the columella has four short, somewhat ascending plaits. There is also an entering cord near the posterior angle of the mouth.

Length 20, diam. 13 mm.; $7\frac{1}{2}$ whorls.

The type of *M. corrugata* has 8 folds on the last whorl. It measures: length 15, diam. 9.4 mm. $6\frac{2}{3}$ whorls. As it has been broken and repaired, and there is no question of the absolute identity with *N. brevis*, the latter only has been figured.

Type of *M. corrugata* is no. 3247 A. N. S. P.; of *N. brevis*, no. 3246 A. N. S. P.

BUCCINIDAE.

Phos semicostatus Gabb. Plate XXII, figs. 23, 24, 25.

Phos semicostatus Gabb, Trans. Amer. Philos. Soc. xv, 1873, p. 212.

A variable species. Typically the coarse folds of the spire give place to fine axial folds on the last whorl, with one to three variceal folds, but sometimes the stronger folds are somewhat numerous, a few examples having seven or eight on the last whorl.

Length 34, diam. 16.6 mm. Type no 3241 A. N. S. P.

Length 34, diam. 18 mm.

Length 33.3, diam. 15.6 mm.

Phos metuloides Dall, Proc. U. S. Nat. Mus., xix, p. 310, pl. 28, fig. 15, from Ponton, Santo Domingo, was not obtained by Gabb.

Phos gabbi Dall.

Phos veraguensis Gabb, Trans. Amer. Philos. Soc. xv, 1873, p. 212. (Not Hinds.).

Phos gabbi Dall, Proc. U. S. Nat. Mus. xix, 310, pl. 29. fig. 4. 1896.

Though undoubtedly distinct, this species is closely related to *P. moorei* Guppy, from the beds at Bowden, Jamaica.

Phos elegans Guppy.

Phos elegans Guppy, Quart. Journ. Geol. Soc. xxii, 1866, p. 290. pl. 16, fig. 11.

Numerous specimens referable to this species were found associated with the specimens labeled *veraguensis* by Gabb.

Phos guppyi Gabb. Plate XXII, figs. 16, 17, 18.

Phos guppyi Gabb, Trans. Amer. Philos. Soc. xv, 1873, p. 212.

The few longitudinal costae and numerous fine revolving raised lines distinguish this species. The sculpture of the neanic stage is sometimes continued in the adult, as in fig. 18.

Length 38, diam. 17.4 mm. (Type fig. 17).

Length 33.4, diam. 15 mm.(Fig. 16).

Type no. 3243 A. N. S. P.

Phos (Strongylocera) costatus Gabb. Plate XXII, figs. 10, 14.

Phos costatus Gabb, Trans. Amer, Philos. Soc. xv, 1873, p. 212.

Phos fasciolatus Dall, Proc. U. S. Nat. Mus. xix, 311, pl. 28, fig. 12, 1896.

The number of longitudinal folds on the last whorl varies from 8–12. Dall's *P. fasciolatus* from the Oligocene at Potrero, Rio Amina, Santo Domingo, is a form or variety of *costatus* characterized by having 14 somewhat narrower ribs, but entirely similar in other respects.

Length 31 mm., greatest diam. 17 mm.

Type no. 3242 A. N. S. P.

Metula cancellata Gabb. Plate XXII, figs. 19, 20.

Metula cancellata Gabb, Tr. Am. Philos. Soc. xv., 1873, p. 205.

There are two specimens of this exquisite species, the larger one (type) measuring, length 24.5, diam. 8 mm., aperture 13.3 mm. It has lost the embryonic whorls.

Type no. 3244 A. N. S. P.

COLUMBELLIDAE.

Columbella inflata (Gabb) Plate XVIII, fig. 14.
Strombina inflata Gabb, Tr. Am. Philos. Soc. xv, 1873, p. 221.

This species is distinguished by its inflated form, the last four whorls being subangular near the suture. There is a very broad, low varix occupying the last fifth of the last whorl, giving it a gibbous appearance, then contracting to the lip.

Length 25.6, diam. 13.4 mm.

The type is no. 3287 A. N. S. P. One specimen only.

Anachis exilis (Gabb) Plate XVIII, fig. 13.
Strombina exilis Gabb, Tr. Am. Philos. Soc., xv, 1873, p. 222.
Anachis exilis Gabb, Dall, Tr. Wagner Free Inst. Sci., iii, p. 139.

The whorls have about 15 straight axial ribs, the last one with spiral cords on the anterior third. Over a small area behind the lip-varix the axial ribs are effaced except near the suture.

Length 4.3, diam. 2 mm.

Type no. 2807 A. N. S. P. Twelve other specimens.

Anachis gracilicostata Pils. and Johns. Plate XVIII, fig. 17.

Proc. A. N. S. Phila., 1917, p. 168.

Anachis (?) **quadrata** (Gabb) Plate XVIII, fig. 8. Text-fig. 16.
Fusus quadratus Gabb, Trans. Amer. Philos. Soc. xv, 1873, p. 204.

Fig. 16
Basal outline of *A. quadrata*.

The smooth embryonic shell has $2\frac{1}{2}$ whorls. First post-nuclear whorl has 10 rounded ribs, after which the ribs rapidly become more widely spaced, until on the last whorl there are five, and in a basal view (text fig. 16) the shell has a square outline. There is no bend in the delicate growth-lines to indicate a posterior sinus, though the aperture otherwise has a *Drillia*-like appearance. In the concavity below the periphery there are fine spiral striae. The columella is broad with rounded face.

Length 8.7, diam. 4 mm.; 8 whorls.

Type no. 3234 A. N. S. P.

The generic place of this strongly marked little shell is uncertain.

Strombina caribaea Gabb. Plate XVIII, fig. 9.
Strombina caribaea Gabb, Tr. Am. Philos. Soc. xv, 1873, p. 221.

This species has a slender, acuminate spire. The surface is smooth except on the narrow anterior part, which has about 12 spiral cords. The lip has a very heavy varix, and six large and sev-

eral small teeth within, below the middle. There is a very heavy callus on the parietal wall, and about 6 teeth on the columella.

Length 10.2, diam. 5.2 mm.; length of aperture 5.8 mm. $8\frac{1}{2}$ whorls.

Type and two other adult and three young specimens are no. 3996 A. N. S. P.

It is well distinguished from *S. haitensis* by the slender, smooth spire.

S. caribaea micra n. var. Plate XVIII, figs. 10, 11.

Smaller and narrower than the preceding, with 8 basal cords, three teeth within the outer lip and none on the columella.

Length 5.8, diam. 2.7 mm.; $7\frac{1}{2}$ whorls.

The two figures represent the same specimen, fig. 11 being the same scale as fig. 9.

Type no. 2800 A. N. S. P.

Strombina haitensis (Sowerby)

Columbella haitensis Sowerby, Q. J. Geol. Soc. vi, 1849, p. 46.
Strombina haitensis Sby., Gabb, Tr. Am. Philos. Soc. xv, 1873, p. 221.

Distinguished by the straight axial ribs of the spire, and small ridge revolving immediately below the suture. Length 8.5 mm.

Strombina politissima Pils. and Johns. Plate XVIII, fig. 15.

Proc. A. N. S. Phila., 1917,p. 168.

S. mira Dall, from Gatun, has a small prominence below the suture, wanting in *politissima*, and the last whorl is striate from the periphery down. Otherwise our species appears very close to it.

Strombina prisma Pilsbry and Johnson.

Strombina prisma P. and J., Proc. A. N. S. Phila. 1911, p. 352, footnote, pl. 25, figs. 9, 10.
Strombina gradata Guppy, in part, Gabb, Tr. Am. Philos. Soc. xv, 1873, p. 221. Not of Guppy.

The type and six other specimens are no. 3292 A. N. S. P.

Strombina cyphonotus Pilsbry and Johnson.

Strombina cyphonotus P. and J., Proc. A. N. S. Phila. 1911, p. 353, footnote, pl. 25, figs. 6, 7.
Strombina gradata Guppy, in part, Gabb, Tr. Am. Philos. Soc. xv, 1873, p. 221. Not of Guppy.

The type and eight other specimens are no. 3893 A. N. S. P.

Strombinella acuformis Dall.

Strombinella acuformis Dall, Proc. U. S. Nat. Mus. xix, p. 312, pl. 29, fig. 6.

Potrero, Rio Amina, Dall; Santo Domingo, Gabb, no. 2960, four specimens.

Metulella venusta (Sowerby)

Columbella venusta Sowb., Q. J. Geol. Soc. vi, 1849, p. 46, pl. 9, fig. 6.
Metulella venusta Sowb., Gabb, Tr. Am. Philos. Soc. xv, 1873, p. 206.

This species reaches a length of 30 mm. It is the type of the genus *Metulella*.

Nassaria isthmica Böse var. *elongata* Toula. Jahrb., k. k. Geol. Reichsanst 1911, pl. 29, fig. 8, appears to be a related *Metulella*.

Metulella fusiformis Gabb. Plate XVIII, fig. 16.

Metulella fusiformis Gabb, Proc. A. N. S. Phila. 1872, p. 270, pl. 11, fig. 3 (Feb. 11, 1873); Tr. Am. Philos. Soc. xv, 1873, p. 206.

The embryonic shell is like that of the following species. Subsequent whorls have many narrow, rounded vertical ribs crossed by somewhat flattened but prominent spiral cords, of which there are five between sutures. There is a low swelling behind the outer lip. Suture is somewhat channeled.

Length 18.6, diam. 6 mm.; $9\frac{1}{2}$ whorls.

Type no. 3216 A. N. S. P.; 5 other specimens.

Metulella dominicensis Pils. and Johns. Plate XVIII, fig. 18.

Proc. A. N. S. Phila., 1917, p. 169.

Perhaps not distinct from *M. williamgabbi* Maury, but that is described as having "spiral striae faint, obsolescent" which is not the case with our two specimens, in which the spirals are strongly developed.

MURICIDAE.

Murex (Chicoreus) brevifrons Lamarck.

Murex brevifrons Lam., An. sans Vert. vii, 1822, p. 161.
Murex (Chicoreus) megacerus Sby. Gabb, Tr. Am. Philos. Soc. xv, 1876, p. 202. (Not of Sowerby).
Murex cornurectus Guppy, Q. J. Geol Soc. xxxii, 1876, p. 521, pl. 28, fig. 4.

There appears to be no character distinguishing the Miocene specimens from the recent. Ten specimens, no. 3256.

Murex rufus compactus Gabb. Plate XXVIII, fig. 1.

Murex (Pteronotus) compactus Gabb, Tr. Am. Philos. Soc. xv, 1873, p. 202.

This differs from the recent *M. rufus* in being much thicker, the frondose structure of the varices is more compact, forming almost solid varices squamose in front. Only one tubercle is present between the varices on the last two whorls, two on the preceding whorl. The greater number of recent specimens have two intervariceal tubercles.

Length 56.4, diam. 32.3 mm.

Type and four other specimens are no. 3258 A. N. S. P.

Murex (Pteropurpura) textilis Gabb. Plate XXVIII, fig. 4.

Murex (Pteronotus) textilis Gabb, Tr. Am. Philos. Soc., xv, p. 202. Dall, Trans. Wagner Free Inst., iii, p. 142, pl. 9, fig. 4.
Murex (Pteropurpura) textilis Dall, t.c. pt. 2, 1892, p. 243.

This beautiful species is also found in the Pliocene of the Caloosahatchie River, Florida. It has been well figured by Dr. Dall.

Length 31, diam. 17 mm.

Type no. 3257 A. N. S. P.

Murex recurvirostris Brod.

Murex recurvirostris Brod., Gabb, Tr. Am. Philos. Soc., xv, p. 201.
Murex messorius Sowb., Reeve, Conch. Icon., *Murex*, fig. 90.

This is an extremely variable species. In the large series before us from both the West Indies and the west coast of Central America and Mexico, we can find no invariable character by which to separate them aside from their geographic distribution. This does not seem ground for specific distinction, for the two have apparently existed unchanged since the Oligocene, when the Alantic and the Pacific Oceans were still connected.

Murex domingensis Sowerby.

Murex domingensis Sowerby, Q. J. Geol. Soc., vi, 1849, p. 49, pl. 10, fig. 5.

This differs from *M. recurvirostris* in usually having a noticeably higher spire, less spinose and slightly more elevated varices, with usually four intervariceal folds that are more evenly nodose (not tuberculate); the fine spiral lines alternating with the nodose spirals are more prominent, and the anterior canal is apparently shorter.

Murex yaquensis Maury.

Murex antillarum Gabb, Tr. Am. Philos. Soc., xv, 1873, p. 202. Not of Hinds.

While resembling somewhat the extreme form of *M. domingensis*, this is no doubt specifically distinct. It is a more slender shell, with rounded, convex whorls, narrowly horizontal below the suture, varices smaller but more spinose; with six intervariceal costae that are crossed by alternating spiral cords, the larger of which where they pass over the costae form compressed nodes, about twelve to each rib. The smooth embryonic shell consists of two trochoidal whorls that are but slightly convex, and much less oblique than in *M. domingensis*.

Length 42, diam. 23 mm.

Length 36, diam. 18.4 mm. (Type of *M. antillarum* Gabb.)

There was an error in Gabb's measurements.

Trophon dominicensis Gabb. Plate XXVIII, figs. 2, 3.

Trophon dominicensis Gabb. Trans. Amer. Philos. Soc. XV, 1873 p. 202.
Murex dominicensis Dall, Proc. U. S. Nat. Mus. xix, 1896, p. 313.

Whorls seven, strongly angular, the axial ribs armed on the shoulder with a hollow spine; above the shoulder they are inflated and elevated above the suture. Above, and a short distance below the carina, the surface is smooth, except for a few very fine lines that are visible under the lens. Below there are conspicuous spiral cords.

Length 17.5, diam. 11 mm. (including spines).

Type no. 3252 A. N. S. P.

Probably *Murex* (*Trophon*) *wèrneri* Toula, Jahrb. k. k. geol. Reichsanstalt lxi, 1911, p. 479, pl. 29, figs. 9*a*, *b*, should be added to the synonymy of *T. dominicensis*.

Muricidea striata Gabb. Plate XXVIII, fig. 7.

Muricidea striata Gabb, Tr. Am. Philos. Soc., xv, 1873, p. 203.

Resembles *M. spinulosa* Heilprin (*M. heilprini* Cossmann) from the Oligocene of Ballast Point, in general appearance, but is much smaller and less elongate; the spire and anterior canal are shorter. the latter being more recurved; also less spinose.

Length 12.3, diam. 7.2 mm.

Type no. 3249 A. N. S. P.

Typhis alatus Sowerby.

Typhis alatus Sowb., Q. J. Geol. Soc., vi, 1849, p. 48, pl. 10, fig. 4.

Represented by only one immature specimen, no. 3250.

Typhis obesus Gabb. Plate XXVIII, figs. 5, 6.

Typhis obesus Gabb, Tr. Am. Philos. Soc., xv, 1873, p. 203. Dall, Proc. U. S. N. M. xix, p. 313.
Typhis alatus var. *obesus* Dall, Trans. Wagner Free Inst. iii, p. 151.

The type, a single perfect specimen, no. 3251, measures: length 24.8, diam. 18 mm. Whether it is to be considered a variety of *T. alatus* depends upon the finding of specimens of intermediate form. The Bowden (Jamaica) series seems to fall into a longer and a shorter race, both smaller than those of Santo Domingo, but of similar shape.

Coralliophila abbreviata (Lam.)

Muricidea lata Gabb, Trans. Am. Philos. Soc., xv, 1873, p. 203.

Gabb's two specimens seem to be identical with this well known recent West Indian species. The type of *M. lata* is no. 3248 A. N. S. P.

Thais santodomingensis Pils. and Johns. Plate 28, figs. 8, 9.

Proc. A. N. S. Phila., 1917, p. 169.

Cymia henekeni Maury.

Cuma tectum Kiener, Gabb, Tr. Am. Philos. Soc., xv, 1873, p. 214.
Cymia woodii (Gabb), in part, Dall, Trans. Wagner Free Inst. Sci., iii, p. 154.
Cymia woodii Gabb, Maury, Journ. Acad. Nat. Sci. Phila. (2), xv, p. 82.
Cymia henekeni Maury, Bull Amer. Pal. v, p. 104.

This is a variable species, as the figures given show, but careful comparisons of the series of over 100 specimens with the type of *Cymia woodii* (Gabb), from the Shiloh Miocene, convince us that the Santo Domingo species is distinct. The Miocene species has more even spiral sculpture, a rounded periphery, and none of the peripheral tubercles, which are present on some part of every specimen of *henekeni*.

In addition to the generic synonyms of *Cymia* given by Dall (Tr. Wagn. Free Inst. Sci. iii, 154), we may mention *Cumopsis* Rovereto, Atti Soc. Ligust. Sc. Nat. e Geogr., X, 1899, p. 105. *C. tectum* may be taken as type.

Cymia woodii is probably a derivative from *C. henekeni*, being the last member of the genus in Atlantic waters.

Cymia henekeni tectiformis n. subsp. Plate XXVIII, figs. 11, 12.

Cuma tectum Gabb, *l. c.* in part.

The shell is similar to *C. henekeni* as far as the middle of the penult whorl, where larger tubercles appear at the peripheral angle. On the last whorl there are about 8 such tubercles, those on the back being very prominent and widely spaced. Above the periphery there are many spirals, and below it the spiral striation is under-laid by about six low spiral ridges. Dense growth-striae as in *C. henekeni*.

Alt. 46, diam. 30 mm. Type; Pl. XXVIII, figs. 11, 12, no. 2794.

Alt. 45, diam. 32.5 mm.

A very large specimen, length 54.4 mm., has but six large tubercles on the last whorl. As the tubercles become progressively more widely spaced, the addition of a half whorl to the usual size decreases the number.

While the adult stage is conspicuously different, the half grown and young specimens are not distinguishable from *C. henekeni*. The two forms were mingled in Gabb's collection.

This form is superficially like *C. tectum*; but that recent Panamic species differs from all of the fossils by having comparatively few, flat spirals, parted by narrow, deeply engraved grooves. The columellar plait also, is heavier and more prominent.

CYMATIIDAE.

Cymatium pileare (Lamarck)

Tritonium (Lampusia) lineatum Gabb, Trans. Amer. Philos. Soc., xv, 1873, p. 211.

The two shells are identical with recent specimens.

Cymatium domingense (Gabb) Plate XXIX, fig. 2.

Tritonium (Ranularia) domingense Gabb, Trans. Amer. Philos. Soc., xv, 1873, p. 212.

This species approaches *C. vespaceum* (Lam.) in many respects, but the more convex whorls, the prominent varices on the whorls of the spire, where there are also more numerous vertical ribs, are differential characters. Moreover, the embryonic shell is more depressed, the post-embryonic whorls enlarge more rapidly, forming a far thicker spire. The anterior canal is noticeably shorter.

Length 28.7, diam. 16 mm.

The type and a smaller specimen are no. 3226 A. N. S. P.

Cymatium præfemorale Maury.

Tritonium femorale Linn., Gabb, Trans. Amer. Philos. Soc., xv, p. 213.

Five specimens, the largest 10 cm. long.

Distorsio constrictus simillimus (Sowerby)

Triton simillimus Sowb., Q. J. Geol. Soc., vi, 1849, p. 48.
Distortia simillimus Sby., Gabb, Trans. Amer. Philos. Soc., xv, 1873, p. 212,.
Distortio simillimus Sby., Gabb, Journ. Acad. Nat. Sci. Phila., viii, p. 353.

The Santo Domingan form, which was named *Triton simillimus* by Sowerby, equals the recent *D. constrictus* in form and size (length 60 to 65 mm), but differs by having the spiral threads and striae between the spiral cords more conspicuous. The length of the anterior canal varies a good deal; when short it is often more reflexed. Except in the detail of sculpture mentioned, this form is identical with the recent *D. constrictus*.

Bowden specimens are smaller, with fewer minute spirals. The form reported by Gabb from the Pliocene of Costa Rica is entirely like the Santo Domingan examples.

D. gatunensis Toula, from the Gatun formation, has fewer and smaller spiral threads among the striae of the intervals, but is otherwise identical with the Santo Domingo race in adult sculpture; but it differs specifically by the larger embryonic shell, as stated by Brown and Pilsbry[20].

The genus *Distorsio* seems to have had its inception in the early

[20] Proc. A. N. S. Phila. 1911, p. 356.

Eocene of the Gulf or mid-American littoral. The *D. septemdentatus* of Gabb, a Lower Claibornian species of Texas, corresponds perfectly with what, on theoretical grounds, the earliest form of the genus should be.

It would seem that the groups *Ranularia*, *Lampusia*, and *Distorsio*, diverged about this time from a common stock. *D. septemdentatum* is but slightly distorted. The irregular bulging of the whorls, correllated with the rise and fall of the sutures and consequent alternate widening and contraction of the body chamber, has just begun, and is yet far less strongly developed than in any later species. The spreading callus, which masks the front in recent forms, has not appeared. The teeth are small, and the mouth not contracted in a grimace. The sculptural features of *Distorsio* are present, but the earlier whorls retain those of other small Eocene Tritons.

Acceleration along the lines foreshadowed in *D. septemdentatus* rapidly ensued, typical Distorsios appearing in the Vicksburg Oligocene. We may suppose that the group spread westward through the open strait between the Americas, and the swimming *Sinusigera*-like larvæ, caught in the Equatorial current, were carried to the West Indies. In southern Europe the genus appeared in the middle Miocene, but whether derived from America or the eastern seas is doubtful.

Of the recent species, *D. anus* (L.), the type of *Distorsio*, has strongly defined characters, everywhere recognized. The others have suffered great vicissitudes in nomenclature, and in order to determine the status of the Oligocene forms a revision of the specific nomenclature was undertaken. The following names and probably some others, have been proposed in the group:

1807 *Distortrix reticulata* Link, Beschr. Rostock Samml, 122.
1809 *Murex cancellinus* Lam., Ann. du Mus. II, p. 225.
1811 *Distorta acuta* Perry, Conchology, pl. 10, fig. 1.
1817 *Murex mulus* Dillwyn, Catal. II, p. 704.
1821 *Murex tortuosus* Borson, Mem. Reale Accad. Sci. Torino, xxvi, p. 306, pl. 1. fig.4.
1822 *Triton clathratus* Lam., Anim. s. Vert, ix, p. 186.
1829 *Triton personatum* M. de Serres, Geogn. Terr. Tert., p. 118, pl. 3, fig. 11, 12.
1833 *Triton constrictus* Broderip, P. Z. S., p. 5.
1844 *Triton ridens* Reeve, Conch. Icon., fig. 46.
1844 *Triton decipiens* Reeve, l. c. fig. 102.
1848 *Triton crassidens* Conrad, Jour. Acad. Nat. Sci. I. 118, pl. 11, fig. 40.
1849 *Triton simillimus* Sowerby, Quart. Jour. Geol. Soc., vi, 48.
1852 *Triton subclathratum* d'Orbigny, Prodr. Pal. Fr., III, 77, 175.
1860 *Distorsio pusilla* Pease, P. Z. S. p. 397.

1860 *Distorsio septemdentata* Gabb, Jour. Acad. Nat. Sci., iv, p. 380, pl. 67, fig. 21.
1873 *Triton grasi* (Bellardi), in d'Anconi, Malac. Plioc. Ital. II, p. 70, pl. 16, fig. 1.
1909 *Distorsio gatunensis* Tuola, Jahrb. K,–K. Geol. Reichsanst. lviii, 1908, p. 700, pl. 25, fig.10.

Recent monographers have lumped all the living forms under one or other of the above names, but there seem to be three or four valid species among them. The principal synonomy of the recent forms is given below; that of the European Miocene species has been duly set forth by Bellardi.[21]

Distorsio reticulata Link. Includes *acuta* Perry, *cancellinus* Lam. (?), *mulus* Dillw., *pusilla* Pse., *cancellinus* Reeve.

This species is the common Indo-Pacific form. Its chief, and so far as we know, invariable character is the presence of a *prominent and somewhat gibbous bilirate ridge or keel at the shoulder, on the back of the shell.*

The strong entering fold on the upper part of the parietal wall is more distant from the oblong tubercle above it than in the Antillean species, and the typical form has a wider sinus on the columella, and less prominent third tooth within the outer lip. Reeve's figure of *cancellinus* (Conch. Icon. pl. 12, fig. 45) well represents the face of the shell.

The *Murex cancellinus*, attributed to Roissy by various authors, was originally described by Lamarck, the account in Sonnini's Buffon being merely a repetition. Lamarck described the shell as a Grignon fossil, but there cannot be much doubt that it was either a stray bleached example of one of the recent species or the European Miocene *D. tortuosum*. As he refers to Martini's figures, those who used the name for the recent *D. reticulata* are not without justification; but in view of the uncertainty attending it, and its later date than Link's name, it had better be placed in the synonymy. No later author has recorded *M. cancellinus*, or any *Distorsio*, from the Parisian Eocene.

D. decipiens (Rve.) is a smaller form with reddish apertural callus and a series of four short folds on the parietal wall above, in place of the two large ones of typical *reticulata*. The third tooth of the lip is prominent; the back angular as in *reticulata*. While it may turn out to be a subspecies of *D. reticulata*, the differential characters are constant in the small series examined.

[21] I Moll. Ter. Terz. Piemonte e della Liguria, I, 231.

Distorsio clathrata (Lamarck). This is the ordinary Antillean species, and has no synonyms except the several misapplications of names really pertaining to the Eastern species, unless *Triton ridens* of Reeve belongs here, which we are unable to determine in the absence of information on its sculpture.

It differs from the Oriental species (*reticulata*) in the *evenly rounded back of the last whorl*, sculptured with regularly spaced spirals. It is not keeled at the shoulder and the lirae are not contiguous there. The two folds on the parietal wall posteriorly are much more nearly contiguous than in *reticulata*: the third tooth within the outer lip is prominent, and the columellar sinus is deep and narrow. Kiener's figures of a specimen from Lamarck's collection are characteristic. (Icon. Coq. Viv., *Triton*, pl. 14, fig. 1.)

So far as we know this species does not occur in the Miocene of Santo Domingo; but in the doubtless somewhat later Bowden Miocene a small, but otherwise practically typical race occurs, which has been figured by Guppy as "*Persona simillima* Sowb." (Quarterly Jour. Geol. Soc. XXII, 288, pl. 17, f. 13.)

Distorsia constricta (Broderip), (*Triton constrictus* Brod., P. Z. S. 1833, p. 5), is similar to *D. reticulata* in the angular back, this form is more like *D. clathrata* in the aperture. At the peripheral angle there are two *contiguous spiral cords;* below these are about ten spirals, and above them only one. The intervals between spiral cords have fine spiral striae.

The third tooth of the outer lip is enlarged; the two posterior folds of the parietal wall are rather near together, as in *Distorsio clathrata*.

The recent form belongs to the Panamic fauna. It was doubtless derived from the Antillean tertiary fauna where the stock is now extinct.

The first recognized member of the series is *D. crassidens* Conrad,[22] of the Vicksburg Oligocene. This is small, and differs from the recent forms by having many unequal spiral threads and striae in the intervals between the spiral cords. Its genetic relation to the later Miocene *D. c. simillima* and the recent *D. con-*

[22] *Triton crassidens* Conr., Journ. Acad. Nat. Sci. Phila. I, 1848, p. 118, pl. 11, fig. 40.
Distortrix crassidens Conr., Proc. Acad. Nat. Sci. Phila., vii, 1854, p. 31.
Distortio cras sidens Conr., Amer. Journ. Conch. I, 1865, p. 20.

stricta might perhaps be expressed best by a trinomial name, *D. constricta crassidens.*

Bursa bufoniopsis Maury.

Bursa amphitrites Maury.

See: Bull. Amer. Pal. v, pp. 108, 109.
Tritonium commutatum Dkr., Gabb, Tr. Amer. Philos. Soc. xv, 1873, p. 211.

These two forms of the *B. affinis* group were not differentiated in the Gabb collection, though both are present.

Bursa crassa proavus n. subsp. Plate XXIX, figs. 4, 5.

Bursa crassa Desh., Gabb., Tr. Am. Philos. Soc. xv, p. 212.

The shell differs from *B. crassa* (Dillw.) by the broader form and more strongly developed granulation; the anal sinus is more oblique and shorter, its end is not so high as the summit of the varix behind it. The smooth embryonic shell is Naticoid, while that of *B. crassa* has a more elevated and conic spire.

Length 25, diam. 19 mm.; 3½ embryonic and 3⅓ later whorls. Type no. 3227 A. N. S. P.

The Bowden form of *B. crassa*[23] is that which approaches the present form most closely, having similar coarse granulation; but it differs by the more conic embryonic stage, and at all stages of growth the anal canal is longer and more direct. It may be called *Bursa crassa bowdenensis* n. subsp., Pl. XXIX, fig. 8. Type no. 3747 A. N. S. P.

In the recent form the granulation is perceptibly finer, or often subobsolete on the last whorl, and another character has come in; in the most progressive examples the peripheral tubercles disappear and one or two intervariceal nodules take their place.

CASSIDIDAE.

Cassis sulcifera Sowerby.

Cassis sulcifera Sowb., Quart. Journ. Geol. Soc. vi, 47, pl. 10, fig. 7, 1849.
Gabb, Trans. Amer. Phil. Soc., xv, 222.

An ancestral form of *C. tuberosa* L., from which it differs chiefly by the smaller size and the stronger axial riblets, which almost disappear, however, in the largest adults. Sowerby's figure was from a young specimen. Old ones become triangular, in an apical view, by the predominance of a dorsal tubercle. The largest example measures:

Length 90, diam. 80 mm.

---

[23] *Ranella crassa* Dillw., Guppy, Q. J. Geol. Soc., xxii, p. 288, pl. 18, fig. 9.

In three peculiar specimens with hypertrophic ventral callus the width exceeds the length. They occurred in a series of 25 normal adult shells.

Cassis (Cypraecassis) testiculus (L).

Cypraecassis testiculus Gabb, Tr. Am. Philos. Soc. xv, 1873, p. 222.

Three rather small specimens 33 to 35. 5 mm. long. In one the spiral grooves appear only around the base, the axial folds being smooth.

Cassis inflata monilifera Guppy.

Cassidea granulosa Gabb, Trans. Amer. Phil. Soc., xv, 222, 1873.
Cassis monilifera Guppy, Quar. Jour. Geol. Soc., xxii, 287, pl. 17, fig. 8.

This form is almost exactly intermediate between *C. inflata granulosa* of the Antillean fauna and *C. abbreviata* of the Panamic region, and may well have been their common progenitor. It has the somewhat coronated whorls of *abbreviata*, there being two prominent granose spirals at the shoulder. The rest of the body-whorl, in the Santo Domingo shells, is granose at the intersections of narrow vertical folds with the spirals, in small examples, varying to nearly free from longitudinal sculpture in some large ones; and irregularly plicate but not granose in others. The smooth embryonic shell is perhaps a little smaller and shorter than in the Pacific *C. abbreviata*, similar to that of *C. granulosa*.

Sconsia lævigata (Sowerby)

Cassidaria lævigata Sowb., Quart. Jour. Geol. Soc., vi. 47, pl. 10, fig. 2. 1849.
Cassidaria lævigata Sowb., Gabb, Tr. Am. Philos. Soc., xv, 1873, p. 222.

The Santo Domingo form is closely related to *S. lintea*, a local lateral branch which left no descendants. It differs from *S. lintea* of the Vicksburg beds only in being free from spiral sculpture in the middle, in the absence of a coronal series of slight pointed tubercles or folds, usually developed in *S. lintea*, and in attaining a more ponderous growth. The young shells, being striate throughout, are indistinguishable. The Pliocene and Recent *S. striata* is more coarsely sculptured than any *laevigata*, and does not become so broad.

The Jamaican *S. sublævigata* is intermediate between *lintea* and *striata* in character, but nearer the latter, of which it may fairly be reckoned a subspecies.

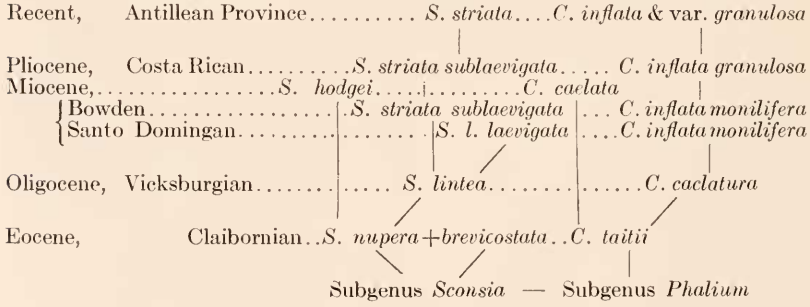
The genus *Sconsia* Gray has an interesting history in the American tertiaries, wherein both its origin and development are revealed. The series begins in the Claibornian Eocene with *S.*

nupera (Conrad),[24] which varies so markedly toward *Cassis* (*Pholium*) *brevicostatus* Conr., that it is evident the two are but slightly divergent mutations of a common ancestor. In *S. nupera* the denticulation of the lip and columella is but weakly developed; varices are present but not strong; the columellar callus is adnate, the siphon as much recurved as in some Eocene species of *Phalium*, and the siphonal fasciole moderately prominent. The initial whorl is smaller than in later forms, but the whole embryonic shell is more globose. A direct descendant of *S. nupera* appears to be *S. hodgei* Conr., in the Miocene of Duplin Co., North Carolina, which is modified chiefly by the loss of a convex siphonal fasciole.

A lateral branch from *S. nupera* leads to *S. lintea* Conr., of the Vicksburg Oligocene, which differs from the parent stock mainly in the more slender embryonic shell. From *S. lintea* probably arose *S. laevigata* Sowb., of the Santo Domingo beds, and *S. sublaevigata* Guppy, of the still later Bowden bed. The latter leads directly to the recent Antillean *S. striata* through the intermediate Pliocene form of Costa Rica.

Sconsia therefore branched from the *Phalium* stock of Cassididae in the early Eocene, and its progress has been marked by the reduction of the columellar callus, shortening of the anterior siphon and loss of a convex siphonal fasciole. It is not allied to *Morio*, as Fischer held.

The mutation series may be graphically represented thus:



On the right side, the ancestry of the modern *Cassis* (*Phalium*) *inflata* is indicated, but with no attempt to arrange the other species,

[24] *Cassis nuperus* Conr., Fossil Shells of the Tertiary Formations of North America. Vol. I, no. 4, p. 46, October 1833. *Buccinum sowerbyi* Lea, Cont. to Geol. p. 164, Pl. 5 f. 169, Dec. 1833. *Semicassis nuperus* Conr., Amer. Jour. Conch. Vol. I, p. 26, 1865.

which are not known to be represented in the Santo Domingo beds. *Phalium*, in a slightly generalized form, was already well developed at the dawn of the American marine Eocene as now known; and the differentiation of the main groups of Cassididae apparently took place earlier.

Morum domingense (Sowerby)

Oniscia domingensis Sowerby, Q. J. Geol. Soc., vi, 1849, p. 47, pl. 10, fig. 3.
Morum domingensis Sowb., Gabb, Tr. Am. Philos. Soc., xv, 1873, p. 223.

This species is closely related to *Morum harpula* (Conr.), of the Vicksburg Oligocene, but it differs by having the expanded callus of the ventral side much less coarsely granulose, and only the peripheral row of sharp tubercles appears upon the whorls of the spire. In *M. harpula* two such rows are visible.

Length 36, diam. 22.3 mm.

DOLIIDAE.

Malea camura Guppy.

Malea camura Guppy, Quart. Journ. Geol. Soc., xxii 1866, p. 287, pl. 17, fig. 9.
Malea ringens Gabb, Tr. Am. Philos. Soc., xv, p. 223.

This is apparently distinct specifically from *M. ringens*, now living on the Pacific coast of Central America and Mexico; but *camura* undoubtedly is ancestral to the living form. The difference is more noticeable in the younger than in the adult individuals. In *M. camura* the lip is less expanded and flattened, and has a uniform slope toward the interior. The callous projection on the parietal wall is always bilobed, not trilobed as in *ringens*; the columellar prominence consists of a large bifurcate tooth with a smaller one below it, the latter usually destinctly separated from the former.

Guppy's type is a young shell, but all of the Jamaica specimens seem to be much smaller than the larger ones of Santo Domingo and Gatun. Santo Domingo examples measure:

Length 71, diam. 55 mm., $4\frac{1}{2}$ post-embryonic whorls.

Length 27.5, diam. 20.5 mm., $2\frac{3}{4}$ post-embryonic whorls.

In specimens of all sizes, the furrows are nearly or quite as wide as the spiral ridges, thus differing from the two forms following. 62 examples in the Gabb collection.

Malea elliptica Pils. and Johns. Plate, XXIX, fig. 3.

Proc. A. N. S. Phila., 1917, p. 169.

Malea goliath Pils. and Johns. Pl. 29, figs. 1, 9.

Proc. A. N. S. Phila., 1917, p. 170.

Probably *Malea sp. indet.* Maury, Bull. Amer. Pal., V, p. 113.
The figures are much reduced in size

Pyrula pilsbryi B. Smith.

Ficus papyratia Say, Gabb, Tr. Am. Philos. Soc., xv, p. 223.
Pyrula pilsbryi Smith, Proc. A. N. S. Phila. 1907, p. 213.

Dr Smith has indicated the differential characters of this species.

Pyrula carbasea Guppy.

Ficus mississippiensis Gabb, Tr. Am. Philos. Soc., xv. Not of Conrad.
Pyrula carbasea Guppy, Q. J. Geol. Soc., xxii, 1876, p. 580, pl. 26, fig. 7.

Although Guppy (Quart. Jour. Geol. Soc. XXXIII, 525) subsequently considered his species a synonym of *Pyrula mississippiensis*, he probably did not actually compare specimens. The two species agree closely in sculpture, the prominent revolving carinae being slightly wider apart in *P. carbasea* than in *P. mississippiensis*. The chief difference however is in the apical whorls. *P. carbasea* has only one smooth, blunt uptilted embryonic whorl, while *P. mississippiensis* shows $2\frac{1}{2}$ or 3 regular smooth whorls. Dr. Burnett Smith has illustrated the embryonic whorls of *P. mississippiensis* in Proc. A. N. S. Phila., 1907, pl. XVII, fig. 5.

One specimen in the Gabb collection, somewhat broken, measures:
Length 29, diam. 13 mm.

CYPRAEIDAE.

Cypraea dominicensis Gabb. Plate XXX, figs. 7, 8.

Cypraea dominicensis Gabb, Tr. Am. Philos. Soc., xv, 1873, p. 235.

The type has the form of *C. lurida*, being a little produced at both ends. There are 36 teeth on the outer lip, 29 on the inner.

Length 39.5, lateral diam. 23.2, dorso-ventral diam. 19 mm.

Type is no. 3003 A. N. S. P.

Cypraea cinerea Gmelin.

We refer one of the specimens included by Gabb in *C. dominicensis* to this recent species.

Cypraea isabella Linné (*patrespatriæ* Maury)

Cypraea isabella L., Gabb, Tr. Am. Philos. Soc., xv, p. 235.

Two specimens, which present no characters differing from the recent shells. The larger one closely resembles a recent *C. isabella mexicana* Stearns which we compared.

Cypraea henekeni Sowerby.

Cypraea henikeri Sowerby, Q. J. Geol. Soc., vi, 1849, p. 45, pl. 9, fig. 3.
Cypraea henekeni Sby., Gabb, Tr. Am. Philos. Soc., xv, p. 235.
Cypraea henikeni Sowb., var., Brown and Pilsbry, Proc. A. N. S. Phila. 1911, p. 356, pl. 26, figs. 9, 10.

This species resembles the recent *C. mus*, and has parallel variations, both having smooth and bicornute or bituberculate forms. In *C. henekeni* the tuberculate form predominates, and the tubercles are larger, being thus more specialized than the modern race of the same stock. It has been well figured by Sowerby. A variety occurs in the Gatun bed.

Length 38 to 66 mm.

Cypræa spurcoides Gabb. Plate XXX, figs. 4, 5.

Cypraea spurcoides Gabb, Tr. Am. Philos. Soc., xv, 1873, p. 235.

Gabb has compared it with *C. spurca*, but of recent species it seems to us closest to large examples of *C. annulus* in shape.

Length 32.8, diam. 20.3 mm. Type no. 2999 A. N. S. P.

Length 24, diam. 15.7 mm.

Cypraea raymondrobertsi n. sp. Plate XXX, figs. 1, 2, 3.

The shell is subovate in basal outline, solid, with the sides heavily calloused, laterally angular, the callus rising high, especially on the left side, and covering the spire, which is marked by a shallow irregular pit. Ends but little produced. The outer lip has 19 strong teeth, narrower than their intervals. Inner lip with 17 teeth. The base is rather strongly convex.

Length 27, lateral diam 19.2, dorso-ventral diam. 14.9 mm.

Somewhat like *C. arabicula* Lam. by its angular sides, the aperture as in *C. albuginosa* Mawe.

Type no. 3995 A. N. S. P.

In the Bowden bed there is a form similar in having angular lateral calluses, but differing by having fewer teeth, 16 and 13 on the outer and inner lips respectively. They extend further upon the base, which is less convex. Length 25.5, width 17.3 mm. This form may be called *Cypræa raymondrobertsi bowdenensis* (Pl. XXX, fig. 6).

Type no. 11146 A. N. S. P.

Cypraea spurca Linné.

A series of six. We find no character to differentiate them from recent shells.

Cypraea campbelliana n. sp. Plate XXX, figs. 9, 10.

The shell is oblong-oval, but slightly produced at the ends, mod-

erately calloused laterally, the callouses dappled with rather small dark spots; dorsal outline evenly arched, spire concealed. Outer lip having 24 teeth. Inner lip with 20 short teeth, not running inward as in *C. cinerea*. In the lower part of the columella an inner series of 5 short teeth may be seen.

Length 30.3, lateral diameter 18.7, dorso-ventral diam. 15 mm.

It is less convex than *C. cinerea*, the posterior slope of the dorsal outline less abrupt. Moreover, the markings of the lateral callouses seem to be of a different character. The teeth are far less numerous than in *C. dominicensis*. Named for Mr. John Campbell, an enthusiastic student of the Cypraeidæ.

The type and three other specimens are no. 3000 A. N. S. P.

Pustularia gabbiana (Guppy)

Pustularia nucleus Linn., Gabb, Trans. Amer. Philos. Soc., xv, p. 236. Not *Cypraea nucleus* L.

Cypraea gabbiana Guppy, Q. J. Geol. Soc., xxxii, 1876, p. 528, pl. 29, fig. 10.

While this species has a general resemblance to *P. nucleus* L., it differs by the following characters: the raised transverse lines which net the tubercles together are more numerous and conspicuous; the tubercles along the lateral margins are larger; the transverse ridges of the base alternate in size, but the smaller ones terminate at the margin of the aperture in teeth equal to those terminating the larger ridges; the teeth of the columellar side do not extend entirely within the aperture, but end on a sort of projecting ledge, inward from which a latticed-granulose sculpture is seen. Finally, the aperture curves more to the left at the upper end.

Length 15.4 to 20.2 mm.

STROMBIDAE.

Strombus haitensis Sowerby.

Strombus haitensis Sowerby, Q. J. Geol. Soc., vi, 1849, p. 48, pl. 9, fig. 7.

Strombus bituberculatus Lam. in part, Gabb, Tr. Am. Philos. Soc. xv, p. 233.

While this may be an ancestor of *S. bituberculatus*, there are considerable differences. The spire is much higher, and the spiral striation differs.

Strombus galliformis Pils. and Johns. Plate XXXI, figs, 1, 2.

Proc. A. N. S. Phila., 1917, p. 170.

Compare *S. maoensis* Maury, which may be the same. It has a shorter spire, and the lip appears to be unknown.

Strombus dominator Pils. & Johns. Pl. XXXII, figs. 1, 9.

Proc. A. N. S. Phila., 1917, p. 171.

A very large Stromb, approaching *S. gigas* in size.

Strombus ambiguus Sowerby,

Strombus ambiguus Sowerby, Q. J. Geol. Soc. vi, 1849, p. 48.

Strongly sculptured spirally, narrower than *proximus* with less developed spines. There are several strong wrinkles on the columellar lip posteriorly.

Strombus ambiguus form **bifrons** Sowerby

Strombus bifrons Sowb., Q. J. Geol. Soc., vi, 1849, p. 48, pl. 9, fig. 9.

This form or incipient race, becomes somewhat larger than typical *ambiguus*; the tubercles of the penult whorl are larger and less numerous. It is therefore a more advanced form, in the acceleration of this sculptural feature forming a transition to *S. proximus*. It has not the posterior wrinkles of the columellar lip of typical *S. ambiguus*, and the outer lip is smooth or nearly so within. The external spiral sculpture is strongly developed.

Length 66, diam. 42. mm.

Strombus proximus Sowerby.

Strombus proximus Sowerby, Q. J. Geol. Soc., vi. 1849, p. 48, pl. 9, fig. 8.
Strombus pugilis L., Gabb, Tr. Am. Philos. Soc., xv, 1873, p. 233.

In this extremely abundant form, the penult whorl bears fewer and larger tubercles or spines than in *S. a. bifrons*. In the prevalent form of the race they are larger than on the last whorl. There is almost invariably an inferior series of tubercles on the left side or very rarely continuing to the lip. Typically the surface is spirally striate; but there are transitions to the form having spirals at the base only. The lip is either rugose or almost plain within. The presence of wide, rounded variceal swellings on the antepenult whorl appears to be variable. The maximum length is about 75 mm., but 55 to 60 mm. is more usual.

Strombus proximus pugiloides Guppy.

Strombus fragilis Moore, Q. J. Geol. Soc., xix, p. 511.
Strombus pugiloides Guppy, Geol. Mag. 1874, p. 433.

The earliest form of this race appeared in the Santo Domingan formation in a form smaller than most *proximus*. The spines have disappeared from the last whorl or half-whorl, and spiral striae are only at the base. The interior of the lip is either smooth or rugose. There are sometimes traces of tubercles of an inferior series. These specimens are transitional between *proximus* and *pugiloides*.

The typical form of *pugiloides* is that of Bowden. It often shows rufous chevrons on the back, and has invariably a smooth lip. An

inferior series of tubercles is never developed. It is also somewhat larger than most Santo Domingan examples.

S. p. pugiloides may be the ancestor of *S. pugilis*, or perhaps it is not in the direct line. *S. pugilis* appears in its typical form in the Pliocene of Florida and Costa Rica

Strombi of the *proximus*-group are abundant shells in the Santo Domingan beds. There are about 150 specimens in the Gabb collection.

As a whole, the series differs from *S. pugilis* and its varieties by having the peripheral series of spines (or when spines are wanting, the rounded shoulder) situated lower on the back of the last whorl, the slope above it longer relative to that below it. This differential character is invariable. Also by the tendency to have an inferior series of tubercles. These may be much reduced, or, in some individuals wanting, yet there is never any trace of them in *S. pugilis*. It appears to us that the evolutionary changes of the stock are lost sight of if the forms *ambiguus*, *bifrons*, *proximus* and *pugiloides* are submerged as synonyms of *S. pugilis*. Nothing with the characters of the recent *S. pugilis* has been found in the Santo Domingan or Bowden beds.

Orthaulax inornatus Gabb. Plate XXX, figs. 13, 14, 15.

Orthaulax inornatus Gabb, Proc. A. N. S. Phila. 1872, p. 273, pl. 9, fig. 3, 4, (Feb. 11, 1873). Tr. Am. Philos. Soc., xv, p. 234. Guppy, Q. J. Geol. Soc., 1876, p. 520, pl. 28, fig. 8. Dall, Bull. U. S. Nat. Mus. No. 90, p. 86, pl. 11, fig. 4. Proc. U. S. N. Mus. LI, 1916, p. 509, pl. 88, fig. 9.

Gabb selected a specimen of medium size for type (his fig. 3, our Pl. XXX, fig. 15). The callus envelopes the spire but does not cover the apex. There is a low longitudinal callous swelling in front of the posterior end of aperture and extending up the spire, and a somewhat more distinct one opposite this on the left side, becoming dorsal on the spire. The shell is thus somewhat compressed dorso-ventrally. Anteriorly there are rather weak spirals.

Length 55, diam. 27, dorso-ventral diam. 21.7 mm.

The largest specimen (Pl. XXX, fig. 14) is injured at the apex and shows no calluses, the outline seen from above being regular, not it flattened dorso-ventrally.

Length 91.3, diam. 41.7 mm.

In a young example (Gabb's fig. 4, our Pl. XXX, fig. 13) the suture has begun to rise at the beginning of the tenth whorl. The ninth has callous swellings on each side, and is therefore a little flattened between face and back. The cavity is also somewhat narrow-

ed within the last swelling. The whorls of the spire show low, rounded varices, two or three on each after the first three or four. This specimen is 30.2 mm. long with 9 whorls and a small part of the tenth above.

Dall's figure of a fragment of the spire shows a somewhat greater apical angle than either of Gabb's specimens.

Orthaulax inornatus altilis n. subsp. Pl. XXX, figs. 16, 17, 18.

Four of Gabb's specimens differ from the above by the shorter spire. Possibly they intergrade with the typical form, as this is not a character of much constancy in Strombidae; but in the absence of evidence on this point it may be well to notice this form. Pl. XXX, figs. 17, 18 represent the largest example. The apex is wholly covered. There is a longitudinal callous hump on the left side opposite the aperture; but as the lip is broken back the hump appears to be dorsal. There are faint traces of a few spirals towards the base.

Length 52, diam., 28 mm., antero-posterior diam. 29.5 mm.

A young example of 9 whorls, 27.5 mm. long. (Plate XXX, fig. 16), is similar to the young shell described under *O. inornatus* except that the spire is shorter, with fewer varices on the whorls. The last whorl is wider and has not begun to ascend, The lower half of the last whorl has numerous (about 17) spiral grooves defining rather flattened cords.

Type no. 4065 A. N. S. P.

TRIPHORIDAE.

Triphora nigrocincta C. B. Adams. (?).

Triphoris nigrocinctus? Adams, Gabb, Trans. Amer. Philos. Soc., xv, p. 239.

We can add nothing to Gabb's note on the single young specimen of this form. It at least indicates a species of the *perversa* group and is probably identical with *Triforis calypsonis* Maury.

CERITHIIDAE.

Cerithium microlineatum Gabb. Plate XXXII, figs. 2, 3.

C. microlineatum Gabb, Tr. Am. Philos. Soc., xv, 1873, p. 236.

The upper whorls show small irregular axial folds. The later ones have a series of low nodes below the suture and fine unequal spirals, part thread-like, part wider, the principal ones granulose. The last whorl has one low, broad varix, the earlier ones rather numerous varices at irregular intervals.

Length 50, diam 18.5 mm. (Type).

It seems to have reached a length of about 60 mm. or more. Resembles somewhat the figure of *C. caloosaense* var. *heilprini* Dall, of the Floridian Pliocene.

Type and nine other specimens no. 2597 A. N. S. P.

Cerithium turriculum Gabb. Plate XXXIII, figs. 1, 2, 8..

C. turriculum Gabb, Tr. Am. Philos. Soc., xv, 1873, p. 238.

Sculpture of strong axial folds, angular at the shoulder, on the median whorls; earlier whorls have lower folds, not angular, and the last whorl has very short folds next the suture. Spiral striation of unequal threads. The broken type specimen figured is 24 mm. long, and has twelve folds on the last whorl.

The sculpture varies a good deal among the 23 examples.

This is probably an ancestral form of the more robust *C. moenensis* Gabb, from the Pliocene of Costa Rica.

Type no. 4067; 22 other specimens no. 4068 A. N. S. P.

Cerithium dominicense Gabb. Plate XXXIII, figs. 3, 4.

Cerithium dominicense Gabb, Tr. Amer. Philos. Soc., xv, 1873. p. 328.

The last $2\frac{1}{2}$ whorls have prominent rounded tubercles below the suture, about 9 on a whorl. Below these there are about 6 tuberculiferous cords on the last whorl, with finer, unequal threads in their intervals. The earlier whorls have axial folds crossed by 4 or 5 principal spiral cords; at first every third fold is somewhat larger, then every fourth; but on the last three whorls such variceal folds do not appear. None of the specimens has a perfect aperture.

Length 25.7, diam. about 11 mm.

Type and three other specimens no. 2594 A. N. S P.

Cerithium uniseriale Sowerby. Plate XXXIII, figs. 16, 20.

Cerithium uniseriale Sowerby, Q. J. Geol. Soc., vi, 1849, p. 51. Not of Guppy.

One specimen, broken at the aperture, has the characters called for by Sowerby's diagnosis. It is related to *C. obesum* Gabb, but there is a band of low tubercles below the suture, separated from the principal series by a depression, and the spiral striation is coarser, uneven, with some weakly granose spirals.

We believe that Gabb's identification of this species is correct. Guppy's interpretation (Q. J. Geol. Soc., XXXII, pl. 29, fig.4) is not in accord with Sowerby's diagnosis. It is *C. obesum ventricosior*. *C. obesum* of Guppy, tab. cit. f. 9, may be a young *C. simplex* Gabb, though this is not certain.

C. uniseriale is an obesely conic shell. There is an infra-sutural series of rather short axial folds, interrupted by a spiral depression or concavity, the folds stronger below it. On the last whorl the folds are smaller than on the penult. About every fourth or fifth fold is stronger on the penult whorl. The surface is rather finely striate spirally, and on the last whorl there are several low cords which are weakly tuberculate, and there is a variceal swelling opposite the aperture. The last half whorl is broken away. There is a strong callous ridge at the posterior part of the inner lip, as in *C. obesum*. As broken the single specimen (no. 2595) measures, length 23, diam. 11 mm.

This form stands near *C. obesum*, but differs by the impression below the suture and the coarser spirals of the last whorl.

Cerithium obesum Gabb. Plate XXXIII, figs. 5, 6.

Cerithium obesum Gabb, Trans. Amer. Philos. Soc., xv, 1873, p. 237.

Gabb's description is somewhat elastic, drawn to cover several forms which he included under *obesum*, but several phrases apply to only one specimen of the type lot: "Outer lip effuse, internally thickened. Length 1 inch, diameter .5 inch" "expanded lip". These phrases must have had in view the specimen shown in our plate XXXIII, figs. 5, 6, since this is the only one in the lot which retains any part of the outer lip, and agrees in size. It measures 24 mm. long, 12.5 wide, aperture 11.8 mm. long. The last whorl rises conspicuously in its last third. The last three whorls have rounded tubercles below the suture, very small and weak on the antepenult. The whole surface is covered with a fine, nearly even spiral striation. Eight whorls are present, the apex being slightly worn. The basal part of the lip is broken.

Type no. 2596 A. N. S. P.; some 13 immature or broken examples, varying in tuberculation, are no. 2596 *a*.

Cerithium obesum ventricosior n. var. Plate XXXIII, figs. 9, 10, 11, 12,

Cerithium uniseriale Guppy, not Sowerby.

The shell differs from *C. obesum* by the wider angle of the spire and relatively large last whorl. This obese form is represented by numerous examples, all having the last third or half of the last whorl broken away. It seems to be what Guppy has figured as *C. uniseriale* Sowb.[25]

[25] Quart. Jour. Geol. Soc. xxxii, pl. 29, fig. 4. Maury, Bull. Am. Pal., 29, p. 124, pl. 21, figs. 14, 15.

The infrasutural tubercles are seen on two to four whorls, but they are very weak except in the last whorl, or sometimes the last two. They may disappear for a half whorl, to reappear later. In some examples there are only weak traces of tubercles. and these appear to form a transition to *C. gurabense* Maury. In all there is a minute but distinct spiral striation, either nearly even, or sometimes about every eighth thread is slightly larger.

Length as broken 27, diam. 13 mm. Type no. 4074, figs. 10–12.

Length as broken 26, diam. 11.5 mm. Fig. 9.

The loss of the last half whorl makes the diameter much less than in a perfect shell.

A peculiar specimen, no. 4075, in which the last whorl is rather short and rounded, and the subsutural tubercles very small, is photographed in Plate XXXIII, figs. 18, 19. It is a young shell, perhaps referable to *C. o. ventricosior*.

Length 25, diam. 13 mm.; 8 whorls.

Cerithium obesum harrisi n. var. Plate XXXIII, figs. 14, 15.

A variety which may be called *harrisi*, was found among unassorted shells. It seems to be a degenerate form, perhaps from an unfavorable station. It is smaller, narrower, covered with slightly unequal spiral striae; there are about 6 tubercles on the back of the last whorl. The suture rises steeply towards the aperture.

Length 22, greatest diam. 9.4, antero-posterior diam. 7.6 mm.; $10\frac{1}{3}$ whorls.

Type no. 4073 A. N. S. P.

Cerithium (obesum?) gurabense Maury. Plate XXXIII, figs. 13, 17.

In another form the size is about the same as the last, but alternate threads are granose. On the last whorl there are infrasutural tubercles, on those preceding, two series of enlarged granules. This appears to be *C. gurabense* Maury.

Length as broken 20 mm.; diam. 7.5 mm.

Cerithium simplex Gabb. Plate XXXIII, fig. 7.

Cerithium simplex Gabb, Tr. Am. Philos. Soc., xv, 1873, p. 238.

? Cerithium obesum Gabb, Guppy, Q. J. Geol. Soc., xxxii, 1876, p. 519, pl. 29, fig. 9. Not of Gabb.

A species of simple, conic form, without varices on the later whorls, though some very low, inconspicuous ones may be seen on the upper. It is spirally grooved, the intervals slightly convex and very unequal, not in the least granose.

The aperture is broken. Columella concave, truncate at base. *No callus on the inner lip above.* An isolated species.

Length 26, diam. 12.7 mm.; $8\frac{1}{2}$ whorls remaining.

Type and five others, no. 2604 A. N. S. P.

Cerithium (?) venustum Gabb. Plate XXXII, fig. 4.

? Cerithium venustum Gabb, Tr. Am. Philos. Soc., xv, 1873, p. 238.

Sculpture of numerous axial folds, tuberculate at the intersections of three low, equal spiral cords, and a narrower one close below the suture. There are some spiral threads between the cords. There are low, rounded varices on the last six whorls, all being on one side of the shell, one varix on a whorl.

The type, no. 2598 A. N. S. P., is broken at both ends. No other specimen was found.

Length 29, diam. 7 mm.; $10\frac{1}{2}$ whorls remaining.

Gabb questioned the genus. It is perhaps impossible without the aperture to define its relations.

Clava plebeia (Sowerby)

Cerithium plebeium Sowerby, Q. J. Geol. Soc., vi, 1849, p. 51, Guppy, xxii, 1866, p. 290, pl. 16, fig. 9 (not good).

An abundant species, perhaps ancestral to the West American *C. gemmata* (Hinds).

Clava has been placed between *Drillia* and *Mangilia* in Bull. Amer. Pal. V, p. 57.

Potamides haitensis (Dall)

Pyrazisinus ? haitensis Dall, Proc. U. S. Nat. Mus. xix, p. 319, pl. 29, fig. 8.

A single mutilated specimen. No. 3197 A. N. S. P.

Potamides prismaticus (Gabb). Plate XXIX, fig. 12.

Cerithium prismaticum Gabb, Trans. Amer. Philos. Soc., xv, 1873, p. 236.

Represented by one imperfect shell, no. 2601 A. N. S. P., measuring, length 57.3, diam. 28 mm. It is well distinguished by the short, heavy ribs or nodes and the deep, "square-cut groove below the suture". Length of the broken specimen 57.3 mm.

Potamides suprasulcatus (Gabb) Plate xxix, figs. 10, 11.

Cerithium suprasulcatum Gabb, Trans. Amer. Philos. Soc., xv. 1873, p. 236.
Potamides ormei Maury, Bull. Amer. Pal. v, p. 126.

The early whorls have three spiral ridges cut into granules by longitudinal sulcations (fig. 10). The space between the upper and the second spiral ridge is deeper than the other spaces, and on the later whorls it becomes a deep, square-cut furrow, defining the su-

tural cingulus. It is this stage which Miss Maury described as *P. ormei*. The longitudinal sulcations disappear on the last two or three whorls, which are not granose. The base has several shallow spiral grooves.

Length 29.5, diam. 17.3 mm.; 5 whorls remaining.

Type and 13 others no. 2600 A. N. S. P.

All of the 14 specimens have been more or less rolled and worn, probably indicating that we have to do with an estuarine snail which had been washed out into the beds of marine deposition.

Potamides roumaini Pils. (Proc. A. N. S. Phila., 1910, p. 487, from between Las Caobas and Hinche, Haiti, W. W. Webster and Edmond Roumain) is a smaller and narrower species than *P. suprasulcatus*, with stronger spiral sculpture. Length 24, diam. 13 mm. Type no. 1314 A. N. S. P.

Potamides caobasensis Pilsbry.

Potamides caobasensis Pils. Proc. A. N. S. Phila. 1910, p. 488.

The shell is smooth, the whorls prominent below the suture. Length (broken) 23 mm. Type no. 2603 A. N. S. P. Not collected by Gabb.

Potamides dentilabris (Gabb) Plate XXIX, figs. 6, 7.

Cerithium dentilabre Gabb, Tr. Am. Philos. Soc., xv, 1873, p. 237.

This shell resembles the East Indian *P. palustris* (L.). There are four spiral cords about equal to their intervals running over small axial folds and an occasional rounded varix about double the size of the folds. Coincident with the varices, two lip-teeth are formed internally, and there is also a callous fold on the parietal wall. Columella has a strong oblique plait. Probably none of this armature would be visible in an entire adult shell, but it is exposed in the fossils, most of which are broken back to the last varix. All have been rolled, and probably were washed out of a lagoon or estuary.

Length 49.5, diam. 21 mm.; 8 whorls remaining.

Type and six other specimens no. 2502 A. N. S. P.

Potamides gastrodon Pils. and Johns. Plate XXXII, figs. 5, 6.

Proc. A. N. S. Phila., 1917, p. 171.

This species differs from *P. transecta* Dall, of the Tampa Silex bed, in details of sculpture, having three instead of four main spirals on each whorl, nodules at the intersections of the axial riblets, and a very prominent varix on the left of the last whorl. The type has a weak thread dividing the spiral interstices on the last whorl. In other specimens of the lot these secondary spirals are well developed.

Bittium yaquense (Gabb) Plate XXXV, fig. 12.

Cerithium yaquensis Gabb, Trans Amer. Philos. Soc., xv, 1873, p. 238.

There are about two varices on a whorl. On the spire there are vertical rounded ribs between the varices, but these disappear on the last one or two whorls. The whole shell is spirally striate. Inside there are short spiral lirae within the varices.

Length 10, diam. 3.8 mm.; 9 whorls remaining.

Length 9, diam. 3.1 mm.; 11 whorls.

Type no. 2619 A. N. S. P.

The type figure is from a shell not quite mature. Most of the specimens are either immature or somewhat broken.

Bittium asperoides Gabb. Plate XXXV, fig. 4.

Bittium asperoides Gabb, Trans. Amer. Philos. Soc., xv. 1873, p. 239.

There are four spiral threads on each whorl, with another visible in the suture, and on the last two whorls traces of one or two faint ones between the major threads. Base with six equal spiral threads. On the penult whorl there are 15 axial ribs, counting the two varices.

Length 4.1, diam. 1.4 mm.; aperture 0.85 mm.; 11 whorls.

Type no. 2616 A. N. S. P. It is an abundant species.

In a form which we take to be a variety (var. *asperandum*) there are more spiral threads, 8 between sutures, and slenderer, more numerous and more arcuate ribs, about 19 on the penult whorl. Length 2.8, diam. 0.95, aperture 7 mm.; 11 whorls.

Type no. 3100 A. N. S. P.

Alabina canaliculata (Gabb) Plate XXXV, fig. 2.

Bittium canaliculatum Gabb, Trans. Amer. Philos. Soc., xv, 1873, p. 239.

Shell imperforate, rather thin, turrited. The sculpture consists of even, rounded, backwardly arched ribs which scarcely pass over the periphery of the last whorl, the base being sculptured with about seven spiral cords, the lower ones very weak. The suture is very deeply impressed, the channel mentioned by Gabb being extremely narrow. In the type specimen there is a low varix at the beginning of the last whorl. Columellar margin reflected above.

Length 3.3, diam. 1.25 mm.; aperture 0.85 mm.; 10 whorls.

Length 4.6, diam. 1.6 mm.; $10\frac{1}{2}$ whorls. (Type).

Type no. 2618 A. N. S. P.

Bittium (*Styliferina*) *cerithidoides* Dall, differs from this species by its carinate upper whorls.

In some of the specimens one or two weak spiral cords may be

seen below the suture, or even very faintly in the intercostal spaces over the whole last whorl, about 6 above the periphery. In the type and most others the ribbed portion shows no spirals.

Alabina angustior n. sp. Plate XXXV, fig. 3.

The shell is decidedly narrower, with fewer axial ribs, about 14 on the last whorl. Base with about 6 spiral cords, the lower ones very weak. Otherwise like *A. canaliculata*.

Length 3, diam. 1 mm.; 10 whorls.

Type no. 4062 A. N. S. P.

LITIOPIDAE.

Alaba maoensis (Gabb) Plate XXXV, fig. 11.

Cerithium maoënsis Gabb, Trans. Amer. Philos. Soc., xv, 1873, p. 239.

The type has lost the tip of the spire, and the last whorl is broken. The whorls are strongly convex, with sculpture of grooves separating low, convex spirals, about 13 grooves on the penult whorl. There is a broad rounded varix on each whorl.

Length 10, diam. 4.7 mm.; nearly 9 whorls remaining.

Type no. 2617 A. N. S. P.

MODULIDAE.

Modulus sp. undet.

This genus is represented by a young shell 6 mm. in diameter, and a fragment of the spire of another. They differ from *M. catenulatus* by wanting the low radial plications of that species. It is evidently close to *M. wilcoxi* Dall, of the Chipola beds, but there are some differences, and without adult shells a positive identification cannot well be made.

VERMETIDAE.

Serpulorbis papulosus (Guppy)

Vermetus papulosus Guppy, Q. J. Geol. Soc., xxii, 1866, p. 292, pl. 17, fig. 3.

Thought by Gabb to be the straight portion of *Petaloconchus domingensis*; but some of the specimens show that the early whorls are very irregularly contorted. The straightened part has three striae between the rows of pustules, the central one larger. The largest tube has a diameter of 10.5 mm.

Vermetus (Petaloconchus) laddfranklinæ (Maury)

The lower whorls are very irregularly coiled, circular in section.

No internal septa were seen in these specimens. The erect, nearly straight portion is cylindric, and has about 12 spiral ridges, and close, fine circular striae. Diameter 4.5 mm. A larger specimen with more slowly revolving spirals has a diameter of 5.2 mm. No. 2812 A. N. S. P. It was referred to *V. decussatus* Gmel., by Gabb (*l. c.* p. 240).

Vermetus (Petaloconchus) domingensis Sowb.

Petaloconchus domingensis Sowb., J. Geol. Soc. Lond., vi, 18, p.51, pl. 10, fig. 9.
Petaloconchus sculpturatus H. C. Lea, Gabb, Tr. Am. Philos. Soc., xv, p. 240.

This is the most abundant species of the family in Gabb's collection. We think it a subspecies of *V. sculpturatus* Lea.

TURRITELLIDAE.

Turritella perattenuata praecellens Pils. and Brn.

Turritella perattenuata praecellens P. and B., Proc. A. N. S. Phila. 1917, p. 36. pl. 5, fig. 12.
Turritella tornata Guppy, in part, Gabb, Tr. Am. Philos. Soc., xv, p. 240 Not of Guppy.

The type (broken) and parts of two other specimens are no. 2608 A. N. S. P.

Turritella tornata Guppy.

Turritella tornata Guppy, Q. J. Geol. Soc., xxii, 1866, p. 580, pl. 26, fig. 12 Gabb, Tr. Am. Philos. Soc., xv, p. 240, (in part).

Seventeen specimens, more or less imperfect, represent this species. Guppy's figure is from one of the most distinctly granose examples.

Turritella calostemma Pilsbry and Brown.

Turritella calostemma P. and B., Proc. A. N. S. Phila., 1917, p. 36, pl. 5, fig. 15.

Between Las Caobas and Thomonde, Haiti; not yet found in Santo Domingo.

Type no. 2610 A. N. S. P.; also no. 2609.

Turritella megalobasis Dall.

Turritella exoleta Linn., in part, Gabb, Tr. Am. Philos. Soc., xv, 1873, p. 240.
Turritella megalobasis Dall, Pilsbry and Brown, Proc. A. N. S. Phila., 1917 p. 36, pl. 5, fig. 14.

A broken specimen 42.5 mm. long, of somewhat over 4 whorls, has a basal diameter of 20.4 mm. The last whorl has a peculiar sculpture, figured by Pilsbry and Brown.

Turritella domingensis Pilsbry and Brown.

Turritella domingensis P. and B., Proc. A. N. S. Phila. 1917, p. 35, pl. 5, figs. 7, 7a, 9.

Turritella exoleta Linn., in part, Gabb, *l. c.*

Type and parts of six smaller specimens are 2611 A. N. S. P.

Turritella sulcigyrata Pils. and Johns. Plate XLII, fig. 15.

Proc. A. N. S. Phila., 1917, p. 171

CAECIDAE.

Cæcum (Meioceras) constrictum Gabb. Text-fig. 17.

Cæcum constrictum Gabb, Trans. Amer. Philos. Soc., xv, 1873, p. 241.

Fig. 17. *Cæcum constrictum.*

The smooth shell is not much arched, has a prominent, irregularly dome-like plug, and is decidedly contracted at the aperture which is not very oblique.

Length 2.05, greatest diam. 0.6 mm.

Type no. 3017 A. N. S. P.

This species differs from *C. nitidum* Stimps. by the far less oblique aperture. The single specimen is evidently adult.

Cæcum anellifer Pils. and Johns. Text- fig. 18.

Proc. A. N. S. Phila., 1917, p. 172.

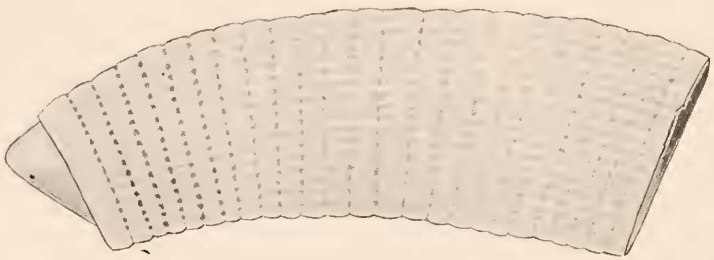


Fig. 18. *Caecum anellifer* P. and J.

MELANIIDAE.

Hemisinus truncatus (Gabb) Plate XXXIV, figs. 14, 15, 16.

Ectracheliza truncata Gabb, Trans. Amer. Philos. Soc., xv, 1873, p. 214; Proc. A. N. S. Phila. 1872, p. 271, pl. 9, fig. 2. (Feb. 11. 1873).

Specimens in good condition show more or less minute, weak spiral striation, such as may be traced in the smoother recent species. Traces of color bands, somewhat wider than in the recent Cuban *H. ornatus*, can be made out on some examples. As in many of the melanians, the spire is extensively truncated, often leaving little more than the last whorl. The shell is larger than any recent Antillean *Hemisinus*, and further differs by the shorter spire and long last whorl, characters which may possibly give *Ectracheliza* standing as a "section" of *Hemisinus*; yet it belongs unquestionably to that genus. The largest example measures, length 36.4, diam. 24 mm. The author has elsewhere alluded to the evidence for Antillean land areas afforded by the Oligocene (or Miocene) freshwater shells (Nautilus XXVIII, p. 84).

Type and 8 others, no. 2878 A. N. S. P.

ARCHITECTONICIDAE.

Solariidae of authors.

Architectonica quadriseriata (Sowb.)

Solarium quadriseriatum Sowb, Journ. Geol. Soc., Lond., vi, 1849, p. 51, pl. 10, figs. 8*a*, *b*. *c*.

Sowerby's figures represent a half grown example. It reaches a diameter of 37 mm.

Torinia rotundata Gabb. Plate XXXIV, figs. 18, 19, 20.

Torinia rotundata Gabb, Tr. Am. Philos. Soc., xv, 1873, p. 228.

There are two spiral cinguli at the periphery, with an intermediate thread, the upper cingulus somewhat wider and prominent. Above it there are four flat cinguli, the upper one narrowest, with fewer granules. Several preceding whorls show five spirals. Under the lens delicate spiral striae are seen upon them. On the base there are five cinguli, the outer one narrowest, with a thread in the grooves on each side of it. The inner cingulus is toothed around the umbilicus, within which two cords and one or two threads run on the last whorl. The whole surface is closely ribbed radially, the riblets more prominent on the cinguli than in their intervals.

Alt. 9.6, diam. 13.5 mm.; 6 whorls.

The holotype is no. 2816 A. N. S. P.

RISSOIDAE.

Not many members of this family are in the collection. Gabb had no luck with his classification of the few obtained, the species of *Rissoina* being referred to four genera. The new genus *Iopsis* was based upon the young stage of a *Rissoina*.

The Rissoinas of the Santo Domingan Miocene seem to have changed very little since that time, all of those known being identical with, or very closely related to, modern species of the same region.

The genus *Crepitacella* Guppy, 1867 (+*Dolophanes* Gabb, 1873) is closely related to *Rissoina*, but may be held distinct by the simple lip, which is sharp, without any trace of the external varix which strengthens the lip of *Rissoina*. Otherwise it has essentially the structure of *Rissoina*.

Crepitacella cepula (Guppy) Plate XXXIV, figs. 12. 13.

Melanopsis capula Guppy,[26] Quart. Journ. Geol. Soc., xxii, 1866, p. 580, pl. 26, fig. 14. (*Melanopsis cepula* on p. 590).
Crepitacella cepula Guppy, Geol. Mag. iv, 1867, p. 500,; Quart. Journ. Geol. Soc., xxxii, 1876, p. 524.
Dolophanes melanoides Gabb, Proc. A. N. S. Phila., 1872, (1873), p. 273, pl. 11, fig. 7; Trans. Amer. Philos. Soc., xv, p. 235.
Pleurotoma (*Mangilia*) *columbella* Dall, Bull. M. C. Z. ix, 1881, p. 60.
Pleurotoma (*melanoides* var.?) *columbella* Dall., Rep. "Blake" Gastrop. 1889. p. 271.
Dolophanes (*melanoides* Gabb, var.) *gabbi*, Dall, Rep. "Blake" Gastrop. 1889, p. 270, pl. 29, fig. 7.

As the affinities of this snail have been variously estimated by the conchologists who have considered it, some statement of the changes of opinion may not be out of place. *Melanopsis capula* (*cepula*) was described from a formation thought to be Upper Miocene, at Cumana, Venezuela. Mr Guppy says:

"I do not know of any form resembling this species, which was probably not a freshwater shell. It may possibly have been an estuarine form. It reminds one of a shortened and widened *Eulima*, or even a *Stylifer*."

In forming the new genus *Crepitacella* for the species, in 1867, Mr. Guppy notes:

"The true position of this shell is probably in the neighborhood of the family Buccinidae, in which I have provisionally placed it. Its nearest relation known to me is *Cyllene pulchella* Adams."

In 1876, Guppy again referred to *Crepitacella cepula*, placing *Dolophanes melanoides* Gabb in the synonymy.

---

[26] The name *capula* was no doubt a typographical error, as in all subsequent references Mr. Guppy called the species *cepula* (a diminutive of *cepa*). The synonymy was worked out by Mr. C. W. Johnson.

In 1873, Gabb described *Dolophanes melanoides* as a new genus and species, with the following note on its systematic position:

"The first impression produced on looking at this little shell is that it is probably a *Melania;* but apart from all of its three hundred associates being marine, which would render such a reference improbable, it has a grouping of characters which ally it so closely to *Struthiolaria*, that I am convinced that it is most probably a near related genus. Its spire is very like that of many species of Strombidae, and in the details of its mouth it differs from *Struthiolaria* in having a thinly encrusted inner lip, an acute outer lip and an obsolete umbicilus, instead of the thickened margins and no umbilicus of that genus. I have tried to identify this species with the shell described by Guppy as *Melanopsis capula* which it seems to resemble somewhat in form and size. But that author gives his shell but seven whorls, and does not describe or figure the flattened tops of the volutions, which are a marked character of the present species. There are also other differences which, however, might be explained by want of care in the artist, but which nevertheless, lead me to believe that, while there may be a generic relation between the two shells, they are most probably different species."

In 1881 Dr. W. H. Dall followed the description of *Pleurotoma* (*Mangilia*) *columbella* with the following remarks:

"This is a species, which in the absence of the soft parts, is difficult to locate. It is possible it should be referred to *Bela*. It is not unlike one or two Arctic species."

In the "Blake" Report, 1889, Dr. Dall refers *P. columbella*, with doubt, to *Dolophanes melanoides* as a variety; also placing *Melanopsis capula* in the synonymy, with a query. He further notes:

"Two specimens of this form are in the collection. Guppy's specimen, from the figure, was evidently deformed. These differ from it, due allowances being made for deformity, in being narrower and in the narrow shoulder in front of the suture.

"The specimen originally serving as type of *M. columbella* is the roundest and the groove behind the siphonal fasciole is reduced to a mere chink. In the Havana specimen the chink is considerably larger and the shoulder more prominent. It seems to stand about one-third of the way from *D. columbella* to *D. gabbi*. I cannot be sure, with so little material, but I suspect this gap might be filled up by a graduated series of specimens if we had material enough. Still, as the forms are not yet connected, and have already been named, it seems best to leave them separate for the present."

Dr. Dall further writes, under the description of *Dolophanes* (*melanoides* var.?) *gabbi*, ("Blake" Report, p. 270):

"This genus was referred to the Struthiolariidae by its author, a reference which has been questioned by all those who have had

occasion to refer to it since. The occurrence of a specimen in the "Blake" dredgings, which, if not identical with Gabb's type is evidently closely related to it, enables me to state that its proper position is probably in this family [Trichotropidae] Unhappily, the operculum and soft parts are wanting so that I cannot confirm my opinion by reference to the details of its organization. I am inclined to believe that another form, also represented in the "Blake" dredgings, is a representative of a shell described as a *Melanopsis* by Guppy, which Gabb himself suspects to be closely related to his *Dolophanes melanioides*. All these specimens are fresh, but the slight traces of epidermis, which they retain, are not of the character of the northern species of *Trichotropis*. Their variations are such that I am led to believe all three may be merely mutations of one specific form. If this be confirmed, the specific name of *capula*, given by Guppy, is the oldest. Whether the differences are sufficient to constitute for *Dolophanes* a rank higher than that of a mere section of the genus *Trichotropis*, a more thorough knowledge of its characters is needed to determine. This pretty and peculiar form is named in honor of the late Wm. Gabb, to whom the generic name is due. I cannot be certain without a comparison of specimens whether the present shell is the same as that described by Prof. Gabb, or not. But the figure is so much like our shell that I can hardly doubt they are very closely related if not the same."

After a careful comparison with the groups mentioned above and others, we are convinced that *Crepitacella* belongs to the Rissoidae. According to the principles of the arrangement in Tryon's Manual of Conchology, Vol. IX, it would be a subgenus of the genus *Rissoina*, close to the Section *Mörchiella* Nevill; but the absence of a labral varix may make it expedient to treat the group as generic, though close to *Rissoina*.

As to the specific synonymy, we are satisfied that the form of the Bowden bed, Jamaica, and that of Santo Domingo named *D. melanioides* by Gabb, are specifically identical, though there are some differences, the Jamaican form being of a somewhat stouter, more robust shape. The type of *D. melanoides* measures, alt. 13.7, diam. 7 mm., length of aperture 6.8 mm. (Plate XXXIV, fig. 12). From the descriptions and figures it does not appear likely that any of the other forms included in the list given above is specifically distinct.

The type of *D. melanoides* is no. 4077 A. N. S. P.

Rissoina (Zebina) laevigata (C. B. Ad.) Plate XXXIV, figs. 3, 4.

Eulima crassilabris Gabb, Tr. Am. Philos. Soc., xv, 1873, p. 227. Not *Rissoa crassilabrum* Garrett, 1857, also a *Zebina*.

Rissoa laevigata C. B. Ad., Contrib. to Conch, 1850, p. 114.

Rissoina laevigata C. B. Ad., Tryon, Man. Conch., viii, p. 390. Dall, Tr. Wagner Free Inst. Sci., iii, p. 342.
Iopsis fusiformis Gabb, Trans. Amer. Philos. Soc., xv, 1873, p. 228; Proc. A. N. S. Phila. 1872, p. 272. (Feb., 1873).

The shell is smooth except for faint growth-lines, the first two whorls somewhat convex, the rest flat. The outer lip has a low external thickening, and no denticles within.

Length 3.85, diam 1.75 mm.; $8\frac{1}{2}$ whorls (Type).

Length 3.35 mm.

These notes and the figures of Gabb's type and a smaller paratype are given to show the exact form he had. The type is slightly larger than Adams indicates for his *laevigata*, the other shell about the same size. They agree well with recent specimens so named.

The type of *E. crassilabris* and another specimen are no. 2606 A.N. S. P.

Fig. 19. *Iopsis fusiformis.*

Iopsis fusiformis Gabb (Text-fig. 19) is the neanic stage of this species. There are two specimens in the type lot. The larger one, text fig. 19, measures 2.2 mm. long, 1.2 diam., having 7 whorls. The outer and basal lip is somewhat broken. The other specimen measures 1.65 by 0.85 mm., with 6 whorls. The outer lip is protractive, thin, and the base has a distinct if short and shallow spout.

These cotypes are no. 2621 A. N. S. P.

Rissoina minuta (Gabb) Plate XXXIV, fig. 1.
Cerithidea minuta Gabb Tr. Am. Philos. Soc., xv, 1873, p. 239.

The sculpture consists of many slightly protractive and weakly sinuous axial riblets, which became very weak at and below the periphery. There are very feeble and fine spiral striae above, becoming much stronger at the periphery and below it, where they are blunt, cord-like, and run over the less prominent ribs. Two of the spiral cords are visible on the penult whorl. There is a strong varix outside the sinuous lip. The aperture has a narrow channel above, and a broad, shallow sinus below. The columellar margin is worn away in the middle, as though by a hermit crab. Apical whorls wanting.

Length 4.7, diam. 2.3 mm.

Type is no. 2818 A. N. S. P.

This species is a little stouter than recent specimens labelled *R. multicostata* (C. B. Ad.). Except for the difference in the spiral sculpture, it agrees rather well with Schwartz von Mohrenstern's figure of *R. multicostata* (which represents *R. krebsi* Mörch, accord-

ing to Tryon). As the exact identity of Adams's species appears to be in doubt, and the correspondence with Gabb's shell is not absolutely exact, we leave open the question of possible identity with a recent species.

Rissoina bryerea (Mont.), variety? Plate XXXIV, fig. 2.

Bittium costatum Gabb, Tr. Am. Philos. Soc. xv, 1873, p. 239.

The type of *B. costatum* is an immature shell, lacking a half whorl perhaps, 3.65 mm. long. It agrees with *R. bryerea* (Mont.) except that there are more ribs, which are therefore somewhat smaller, but not so small as in *R. minuta* (Gabb), or *R. multicostata* (C. B. Ad.) The name used by Gabb had already been given to another species by C. B. Adams. If distinct from *bryerea* it may be called var. *binominis*.

The type is no. 2819 A. N. S. P.

Rissoa epulata Pils. and Johns. Plate XXXIV, fig. 5.

Proc. A. N. S. Phila., 1917, p. 172.

Rissoa (Alvania) proavita Pils. and Johns. Plate XXXIV, fig. 6.

Proc. A. N. S. Phila., 1917, p. 173.

CAPULIDAE.

Capulus inornatus Gabb. Plate XXX, figs. 11, 12.

Capulus inornatus Gabb, Tr. Am. Philos. Soc., xv, 1873, p. 242.

The embryonic shell has $1\frac{1}{2}$ whorls, the spire in a plane. It is very close to the columellar margin of the last whorl. The last whorl shows faint, fine and close radial sculpture in some places. The columellar margin is coarsely crenulated, probably due to the supporting object.

Length, from umbo to opposite margin 14, width 13, convexity 7 mm.

The holotype is no. 2829 A. N. S. P.

HIPPONICIDAE.

Hipponix pilosa Desh.

Scurria mitra Esch., Gabb, Tr. Am. Philos. Soc., xv, p. 245.

Two somewhat worn examples agree well with this common West Coast species of the recent fauna. We can find no significant differences except those of time and space.

Hipponyx otiosa Pils. and Johns. Plate XXX, figs. 19, 20.

Proc. A. N. S. Phila., 1917, p. 173.

CALYPTRAEIDAE.

Crepidula plana Say.

Crypta fornicata Linn., Gabb, Tr. Am. Philos. Soc., xv, 1873, p. 242.

There can be no doubt of the identity of the single specimen.

Crucibulum auricula (Gmel.)

Crucibulum spinosum Sby., in part, Gabb, Tr. Am. Philos. Soc., xv, p. 241.
Crucibulum auricula Gmel., Dall, Tr. Wagn. Free Inst. Sci., iii, p. 349.

A large specimen, length 25, alt. 11.7 mm., is seated on the spire of a *Conus*. Another 26 mm. long became smooth after attaining a length of 9 mm.

Crucibulum auricula spinosum Sowerby.

Crucibulum spinosum Sby., in part, Gabb, *l. c.*

Two rather small examples.

Crucibulium striatum (Say)

A single small specimen, 5.4 mm. long, is identified with some doubt. The cup is more angular anteriorly than in recent shells. Exterior smooth.

Calyptraea centralis (Conrad)

Trochita sp. undet., Gabb, Tr. Am. Philos. Soc., xv, p. 242.

The single small specimen agrees with recent shells from St. Thomas, identified as *C. candeana* Orb., a name which Dall considers a synonym of *centralis* (Trans. Wagn. Inst., iii, 353).

XENOPHORIDAE.

Xenophora dilecta (Guppy) Plate XXXII, figs. 7, 8.

Phorus agglutinans Lam., Gabb, Tr. Am. Philos. Soc., xv, 1873, p. 241.
Phorus dilectus Guppy, Q. J. Geol. Soc., xxxii, 1876, p. 529, pl. 28, fig. 10.

This form was described and figured by Mr. Guppy from a young specimen. The shell is far less profusely loaded with shells and other objects than the recent *X. conchyliophora*, and shows a much greater part of the proper surface, which is copiously sculptured with fine protractive wrinkles. Base as in *X. conchyliophora* except that the umbilical chink is larger. The parietal wall is honey yellow. Largest example has a diameter of 68 mm.

This *Xenophora* may perhaps be a local race of *X. conchyliophora*, but its characters indicate at least subspecific distinction.

Xenophora imperforata (Gabb) Plate XXXI, figs. 3, 4.

Onustus imperforatus Gabb, Tr. Am. Philos. Soc., xv, 1873, p. 241.

The upper surface has the usual sculpture of fine, crowded, protractive wrinkles, which are not granulous. The last $3\frac{1}{2}$ whorls

show no trace of attached objects, but several preceding whorls have little pits or facets where bits of shell or pebbles were no doubt attached, as in the recent *X. indica* (Gm.), though the agglutinating stage was shorter, not lasting beyond the size of about 8 mm. diameter. The base is nearly smooth, having growth-lines only. The narrow umbilicus is more than half covered by the dilated columellar lip. There is no spiral welt near the periphery, as in the recent *X. caribaea* (Petit), which also has a wider umbilicus and carries more load.

Alt. 30, diam. 72 mm.

Type is no. 3221 A. N. S. P.

NATICIDAE.

Natica sulcata (Born)

Natica sulcata Born, Gabb, Tr. Am. Philos. Soc., xv, p. 223.

Nearly all of the numerous examples lack the spirals of typical *N. sulcata*, being the form called *rugosa* (Gmel.).

Natica canrena (L.)

Natica canrena Linn., Gabb, Tr. Amer. Philos. Soc., xv, p. 223.

The specimens agree fully with recent shells, but they are without opercula.

Natica youngi Maury (*finitima* Pils. and Johns. Plate XXXIV, fig. 21).

Proc. A. N. S. Phila., 1917, p. 173.

This appears to be identical with the prior *N. youngi* Maury.

Polinices mamillaris (Lam.)

Mammilla mamillaris Lam., Gabb, Tr. Amer. Philos. Soc., xv, p. 223.
Natica subclausa Sowerby, Q. Journ. Geol. Soc., vi, p. 51.

This species was taken in abundance.

Amauropsis guppyi (Gabb) Plate XXXIV, figs. 25, 26, 27.

Amaura guppyi Gabb, Tr. Amer. Philos. Soc., xv, 1873, p. 224.
? Natica phasianelloides D'Orb., Guppy, Q. J. Geol. Soc., xxii, 1866, p. 291, pl. 17, fig. 1.

This graceful shell varies in length of the spire, as the figures show. The type measures, length 32.3, diam. 21.5 mm., and has 8 whorls, the apex not quite perfect, having lost one whorl perhaps. Others are larger, 37.4 mm. long, with $5\frac{1}{2}$ whorls remaining.

The type and numerous other specimens are no. 2881 A. N. S. P.

Amauropsis ocalana Dall[27] has been reported from the Rio Anima,

[27] Proc. U. S. Nat. Mus., li, 1916, p. 519, pl. 88, fig. 11.

Santo Domingo.[28] It resembles *P. guppyi*, and the Santo Domingan specimens should be compared with that species. The specimens reported from the Canal Zone as *Lupia perovata* Conr. also need comparison with *A. guppyi*. Mr. Guppy appears to have identified this species with *Natica phasianelloides* Orb.,[29] but that is a very large species, 70 mm. long, and otherwise different in shape.

This species and the next have not the channelled suture of *Amauropsis*, and perhaps belong to *Ampullina* or *Lupia*.

Amauropsis altispira (Gabb) Text-fig. 20.

Eutropia altispira Gabb, Tr. Am. Philos. Soc., xv, 1873, p. 242.

Fig. 20. *Amauropsis altispira.*

The shell is imperforate, polished, composed of $5\frac{1}{2}$ rounded whorls, which slope below the suture. The columella is slightly thickened, and is dilated slightly above the axial region. Outer lip is broken.

Length 4.4, diam. 2.75 mm.

In our opinion, this is not a *Phasianella* (*Eutropia*). It appears to be a rather narrow species of *Amauropsis*. The specimen is probably not adult, but it is not the young of *A. guppyi* or of any other known species of these beds.

Type no. 2877 A. N. S. P.

Amauropsis burnsii meridionalis n. subsp. Plate XXXIV, figs. 23, 24.

Close to *Polynices* (*Amauropsis*) *burnsii* Dall, of the Chipola bed, but differing by the shallower, flat-bottomed channel along the suture, the parapet bounding it being narrower. The aperture is not so wide as in *burnsii*. Lip very narrowly reflected.

Length 23.4, diam. 18 mm.; 5 whorls remaining.

Type No. 2876 A. N. S. P.

Sinum excentricum (Guppy)[30] is not represented in the Gabb collection.

EPITONIIDAE.

The fragmentary specimens which Gabb referred to *Scalaria*

[28] Ibid., xix, p. 329.

[29] Paléontologie of de la Sagra's Cuba; p. 9, pl. 1, fig. 7. It was found near Havana. Some doubt has been expressed by Doctor Dall as to whether the *Paléontologie* was ever properly published, but I have seen two copies of both text and plates. The text (French edition) bears date of 1853 on the title page, and as d'Orbigny dates the new species 1852, it is likely that the plates were published in that year, or perhaps that was the date of the Spanish edition.

[30] *Sigaretus excentricus* Guppy, Q. J. Geol. Soc., xxxii, 1876, p. 519, pl. 29, fig. 11

denticulata Sowerby do not seem sufficient for a positive determination.

Epitonium amplum (Gabb) Plate XXXIV, fig. 22.

Scalaria ampla Gabb, Tr. Am. Philos. Soc., xv, 1873, p. 224

On the last whorl the ribs become wider downwards, until near the axis they run together. In the intervals two or three low spiral cords may be seen above the much stronger basal cord. There are 10 ribs on the last whorl.

Length 14, diam. 10.8 mm., 4 whorls remaining.

Type is no. 2823 A. N. S. P. It is from the brown shale east of Guayubin.

Sthenorytis toroensis Dall, from Limon Bay, has much in common with this species, but the varices are recurved, and there is no basal cord.

Epitonium minutissimum (Gabb) Plate XXXIV, figs. 10, 11,

Scalaria minutissma Gabb, Tr. Amer. Philos. Soc., XV, 1873, p. 224.

Two of the twelve ribs on the last whorl are distinctly larger, both higher and thicker. All bear short points near the suture. In the intervals of the major spirals there are several, usually three, smaller spirals, and the whole is delicately latticed by axial threads.

Length 6, diam. 2.3 mm., $8\frac{1}{2}$ whorls remaining.

Type and 4 other specimens are no. 2824 A. N. S. P.

Epitonium santodominganum n. sp. Plate XXXIV, figs. 8, 9.

The shell is imperforate, slender, with about $3\frac{1}{2}$ smooth embryonic and $5\frac{1}{2}$ sculptured whorls. Sculpture of thin ribs on the spire, somewhat thicker on the last whorl, where there are two varices, one near its beginning, the other on the back. There are about 18 ribs in all on the last whorl. The intervals have sculpture of narrow low spiral cords, with several smaller, less distinct threads between them on the last two whorls. The cords slightly crenulate the posterior edges of the ribs. Aperture short-ovate.

Length 3.9, diam. 1.5 mm.

Type no. 4064 A. N. S. P.; with *Scalaria minutissima* Gabb.

Epitonium amosbrowni n. sp. Plate XXXIV, fig. 7.

A minute, imperforate, rather thin species, with about 2 smooth, convex embryonic whorls followed by $4\frac{1}{2}$ very convex whorls with deep suture. Sculpture of thin, equal ribs each rising in a blunt point at the shoulder, 16 on the last whorl. The intervals have low indistinct spiral cords on the lower half of each whorl, but not ex-

tending to the axis on the last whorl. Aperture very shortly oval.

Length 3.3, diam. 1.5 mm.

Type and two young specimens No.4063 A.N.S.P.; with *Scalaria minutissima* Gabb and the preceding species.

Aclis (Amblyspira) bartschiana Pils. and John. Plate XXXV, fig. 5.

Proc. A. N. S. Phila., 1917, p. 174.

Aclis (Hebetaclis) alta (Gabb) Plate XXVII, fig. 6.

Auriculina alta Gabb, Trans. Amer. Philos. Soc., XV, 1873, p. 226.

The surface of this shell is not plain, as stated by Gabb. It is densely covered with slightly waved spiral striae, several of those below the suture being larger. The apex is obtuse, the first whorl being naticoid, glossy and smooth, with nearly level top and the tip a little turned down; subsequent whorls are convex, separated by a narrow, very deeply impressed suture. The thin concave columella passes continuously into the parietal wall.

Length 3.3, diam. 1.1 mm., $5\frac{1}{2}$ whorls.

The type, no. 3170, is the largest of five specimens.

The generic position of this graceful and delicate shell is not clear to me, but it has some resemblance to *Aclis*. The obtuse summit and the small number of relatively long whorls have caused its segregation as the type of a new subgenus to be called *Hebetaclis*. The aperture recalls that of *Berthais* Melvill, but the apical whorls differ.

PYRAMIDELLIDAE.

Doctor Bartsch's table of classification[31] has proved indispensible in dealing with this group. Unfortunately he has not yet treated of the Antillean species.

The Santo Domingan Turbonillas all conform pretty closely to modern types, but part of the Odostomias do not fit readily into the tables arranged for recent species. This may be due to our fragmentary knowledge of the recent Caribbean Odostomias.

In addition to the species enumerated below, there are some Turbonillas and Odostomias still to be worked out.

Several species of *Turbonilla* and *Odostomia* have been described by Miss Maury, Bull. Amer. Pal. V, pp. 147-151, but the figures are so poor that no satisfactory comparisons with our species can be made from them.

[31] A Monograph of West American Pyramidellidae, Bull. 68 U.S.N. Mus., 1909.

Pyramidella (Longchæus) jamaicensis Dall.

Pyramdella (Longchæus) jamaicensis Dall, Proc. U. S. Nat. Mus. xix, p. 315, pl. 29, fig. 10.

Callolongchaeus jamaicensis Dall, Trans. Wagn. Inst. iii, p. 1584.

A single young example, length 2.3 mm., was found in the bottle with *P. canaliculata.*

Pyramidella (Triptychus) nivea (Mörch)

Obeli cus niveus Mörch, Malak. Blätter, xxii, 1875, p. 159.

Cerithium biseriatum Gabb, Journ. A. N. S. Phila. (N. Ser.), viii, p. 361, pl. 46, fig. 50.

A single young specimen agrees with Gabb's type of *C. biseriatum,* which came from Costa Rica; also with the young of the recent form. *Oscilla indiscreta* Guppy is a closely related Bowden species.

Pyramidella canaliculata (Gabb) Plate XXXV, fig. 14.

Obeliscus canaliculatus Gabb, Trans. Amer. Philos. Soc., xv, 1873, p. 225.

The shell is straightly conic. The sutural channel is formed by the excavation of the lower border of each whorl and a narrower excavation of the upper border, which is minutely crenulated just below the suture, and when quite perfectly preserved, at the shoulder angle also, at least on some of the whorls. A little thread just above the suture divides the sutural channel. There is a not very large gutter immediately below the periphery. The whorls are quite flat and plain between the channels. There are three columellar plaits, the upper one wide and subhorizontal. Within the outer lip are four plicae, the lower one small, the upper very small. Umbilicus narrow, circular, bounded by a strong, convex fasciole.

The largest entire specimen (type) is 9.5 mm. long, 3.5 wide, with 12 whorls, the tip of the spire lost. Another shell was larger, diam. 4.6 mm., the spire and last whorl broken, three strong teeth within the outer lip.

Type no. 4080 A. N. S. P.

Gabb's description and his vial of specimens were composite. The latter contained in addition to the form we select as typical *P. canaliculata,* specimens of the following species: one *Pyramidella jamaicensis,* and several *Odostomia pyrgulopsis,* which were doubtless put in as young *P. canaliculata.*

Gabb's measurements were evidently estimated from what the largest examples would measure if the lip and spire were perfect. We select an immature shell as type, since it accords best with most of his definition.

There is a *Pyramidella canaliculata* of Sowerby (Proc. Zool. Soc.,

London, 1873, p. 720). I am informed by F. Martin Duncan, Librarian of the Zoological Society, that the number of the Proceedings containing this page was published about March, 1874. It was therefore later than Gabb's species. Sowerby's *P. canaliculata* may be called *Pyramidella insularum*.

Pyramidella forulata famelica Pils. and Johns. Plate XXXV, fig. 13.

Proc. A. N. S. Phila., 1917, p. 174.

Type no. 4079 A. N. S. P. This is probably *P. olssoni* Maury.

Turbonilla (Careliopsis) turritelloides Gabb. Plate XXXVI, fig. 1.

Turbonilla turritelloides Gabb, Trans. Amer. Philos. Soc., xv, 1873, p. 226.

The nucleus is helicoid, spire rather low, of about $2\frac{1}{2}$ whorls, early post-nuclear whorls convex, becoming flattened in the lower two-thirds. There are faint traces of vertical ribs and numerous, unequal spiral striations.

Length 6.5, diam. 1.2 mm.; 14 post-nuclear whorls.

Type no. 3029 A. N. S. P. Numerous other specimens.

Turbonilla (Pyrgiscus) dominicensis Gabb. Plate XXXVI, fig. 3.

Turbonilla dominicensis Gabb, Trans. Amer. Philos. Soc., xv, 1873, p. 225.

The nucleus is small, helicoid, subsequent whorls sculptured with strong, straight rounded ribs, which are very slightly protractive on the upper part, changing to slightly retractive in the last three whorls. On the penult whorl there are 20 ribs. On the last whorl the ribs gradually disappear just below the periphery. Spiral sculpture of weak, unequal striae, not visible on the summits of the ribs; the base is convex, with more regular spiral striae. The whorls are somewhat convex throughout. The columella is thin, slightly sinuous, the edge reflected and appressed above.

Length 6, diam. 1.4 mm., $9\frac{1}{2}$ post-nuclear whorls.

Type no. 3031 A. N. S. P.

Turbonilla (Pyrgiscus) santodomingensis Pils. and Johns. Plate XXXVI, fig. 4.

Proc. A. N. S. Phila., 1917, p. 175.

Turbonilla (Pyrgiscus) beatula Pils. and Johns. Plate XXXVI, fig. 2.

Proc. A. N. S. Phila., 1917, p. 174.

Turbonilla (Chemnitzia) galeata Pils. and Johns. Plate XXXVI, fig. 5.

Proc. A. N. S. Phila., 1917, p. 175.

Turbonilla (Chemnitzia) peræqua Pils. and Johns. Plate XXXVI, fig. 6.

Proc. A. N. S. Phila., 1917, p. 175.

Turbonilla (Nisiturris) angustula Pils.and Johns. Plate XXXVI, fig. 7.
Proc. A. N. S. Phila., 1917, p. 176.

Turbonilla (Nisiturris) aratibacillum Pils. and Johns. Plate XXXVI, fig. 8.
Proc. A. N. S. Phila., 1917, p. 176.

Turbonilla (Nisiturris) insititia Pils. and Johns. Plate XXXVI, fig. 9.
Proc. A. N. S. Phila., 1917, p. 176.

Turbonilla (Nisiturris) undecimcostata Pils. and Johns. Plate XXXVI, fig. 10.
Proc. A. N. S. Phila., 1917, p. 177.

Turbonilla (Nisiturris) pertenuis Gabb. Plate XXXVI, fig. 11.
Proc. A. N. S. Phila., 1917, p 177.

Turbonilla (Nisiturris) contexta Pils. and Johns. Plate XXXVI, fig. 12.
Proc. A. N. S. Phila., 1917, p. 177.

It may be noted here that *Turbonilla bartschiana* and *T. gatunensis* Brn. & Pils.[32] belong to the subgenus *Nisiturris*, not to *Chemnitzia* as originally stated.

Turbonilla (Tragula) egressa Pils. and Johns. Plate XXXVI, fig. 13.
Proc. A. N. S. Phila., 1917, p. 178.

Fig. 21. *Odostomia ingloria.*

Fig. 22. *O. ingloria calvata.*

Fig. 23. *O. santodomingensis.*

Fig. 24. *O. myrmecoon.*

Odostomia (Odostomia) ingloria Pils. and Johns. Text-fig. 21.
Proc. A. N. S. Phila., 1917, p. 178.

Odostomia santodomingensis Pils. and Johns. Text-fig. 23.
Proc. A. N. S. Phila., 1917, p. 179.

Odostomia myrmecoon Pils. and Johns. Text-fig. 24.
Proc. A. N. S. Phila., 1917, p. 179.

Odostomia (Eulimastoma) pyrgulopsis Pils. and Johns. Text-fig. 25.
Proc. A. N. S. Phila., 1917, p. 179.

[32]Proc. A. N. S. Phila. 1912, pp. 509, 510.

Odostomia (Eulimastoma) bathyraphe Pils. and Johns. Text-fig. 26.
Proc. A. N. S. Phila. 1917, p. 180.

Fig. 25. *Odostomia pyrgulopsis..*

Fig. 26. *O. bathyraphe.*

Fig. 27. *O. vexator.*

Odostomia (Evalea?) vexator Pils. and Johns. Text-fig. 27.
Proc. A. N. S. Phila., 1917. p. 180.

Odostomia (Goniodostomia) superans Pils. and Johns. Text-fig. 28.
Proc. A. N. S. Phila. 1917, p. 180.

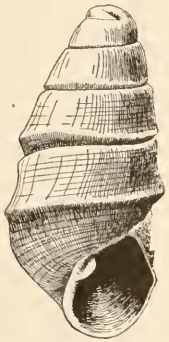


Fig. 28. *Odostomia superans.*

Fig. 29. *O. circumvincta.*

Odostomia (Goniodostomia) circumvincta Pils. and Johns. Text-fig. 29.
Proc. A. N. S. Phila., 1917, p. 181.

Odostomia (Parthenina?) cyclocephala Pils. and Johns. Plate XXXVI, fig. 14
Proc. A. N. S. Phila., 1917, p. 181.

Odostomia (Odostomidea) bartschiana Pils. and Johns. Plate XXXVI, fig. 15.
Proc. A. N. S. Phila., 1917, p. 182.

Odostomia (Odostomidea) mogindo n. sp. Plate XXXVI, fig. 16.

The shell resembles *O. bartschiana,* but has the whorls swollen and shouldered below the suture. The first whorl is smooth, strongly convex above, turned in at the apex, the suture deep from the be-

ginning. The second whorl is convex, weakly ribbed; third and later whorls are swollen and subangular below the suture, then flattened with sculpture of large, well-spaced, axial ribs, the concave intervals finely striate, with in some places the faintest traces of spiral striae also. On the last whorl there are eleven ribs, on the penult ten. On the dorsal part of the last whorl the ribs disappear towards the base. The small aperture is ovate and oblique, with continuous peristome and a strong submedian fold on the inner margin.

Length 2.35, diam. 0.83 mm.; slightly over 6 whorls.

Type no. 3016 A. N. S. P.

Odostomia (Chrysallida) dulcis Pils. and Johns. Plate XVIII, fig. 7.

Proc. A. N. S. Phila., 1917, p. 182.

MELANELLIDAE. (*Eulimidae*)

Niso grandis Gabb. Plate XXXIV, fig. 17.

Niso grandis Gabb, Trans. Amer. Philos. Soc., xv, 1873, p. 227.

This shell is represented by a specimen of 4 whorls, the upper part and the last half whorl wanting. The remaining whorls are a trifle more convex and shorter than the corresponding part of *Niso willcoxiana* Dall, indicating a distinct though allied species. The length is 19.3, diam 12.4 mm.

Type no. 3018 A. N. S. P.

Niso minuta Gabb. Text-fig. 30.

Niso minuta Gabb, Trans. Amer. Philos. Soc., xv, 1873, p. 227.

A single example, no. 3019. The 6 whorls are just perceptibly convex. The last three have slender white axial lines, which appear to be very slightly raised on the pale gray ground. There is a strong keel about the umbilicus, but none at the periphery.

Length 1.85, diam. 0.95 mm.

Further specimens are needed to show whether it attains a greater size.

Melanella astuta Pils. and Johns. Plate XXXV, fig. 7.

Proc. A. N. S. Phila., 1917, p. 182.

Melanella gabbiana Pils and Johns. Plate XXXV, fig. 6.

Proc. A. N. S. Phila., 1917, p. 183.

Strombiformis sarissiformis Pils. & Johns. Pl. XXXV, fig. 9.

Proc. A. N. S. Phila., 1917, p. 183.

The aperture is wider in the unbroken adult stage than in the

type, which has lost about one-fourth of a whorl.

Strombiformis prælubrica Pils. and Johns. Plate XXXV, fig. 10.
Proc. A. N. S. Phila., 1917, p. 183.

Strombiformis ischnon Pils. and Johns. Plate XXXV, fig. 8
Proc. A. N. S. Phila.,1917, p. 183.

Fig. 30.
Niso minuta.

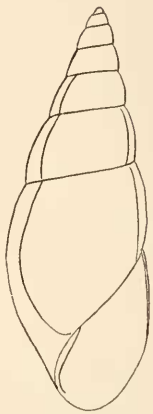


Fig. 31.
Strombiformis stimulus.

Strombiformis stimulus Pils. and Johns. Text-fig. 31.
Proc. A. N. S. Phila., 1917, p. 183.

This minute shell is not a *Subularia*, as it lacks the axial keel near the base and is not noticeably flattened dorso-ventrally.

TURBINIDAE.

Turbo dominicensis Gabb. Plate XLII, figs. 16, 17.
Turbo dominicensis Gabb, Tr. Amer. Philos. Soc., xv, 1873, p. 242.

Seven specimens are all imperfect, but the species is well characterized. There is a conspicuous, beaded spiral cord below the suture, followed by five minor beaded spirals, alternately smaller and larger; then another prominent cord followed by three minor spirals the middle one larger. At the periphery there is a third larger cord, and below it about 9 spirals, those on the base subequal, and all cut into beads by axial grooves. Around the axial region there is a broad and conspicuous callus. The shell was unusually thin for a *Turbo*. The specimen selected as type (fig. 16) consists

of little more than two whorls. Another (fig. 17) shows the conic spire usual in the genus.

Diameter of type 25 mm.

Many opercula of *Turbo* collected probably belong, at least in part, to this species. Unworn specimens vary remarkably in the degree of callous filling over the nucleus, the number of spiral furrows and the amount of granulation; the series forming a transition from the operculum of *Senectus* to that of *Callopoma*. It appears likely that several species of *Turbo* are involved.

Type no. 2843 A. N. S. P.

Astræa domingensis Pils. and Johns.

Proc. A. N. S. Phila., 1917, p. 184.

This is perhaps *Astralium sublongispinum* Maury. It resembles *A. karlschmidti* in shape, but has more numerous spirals above.

PHASIANELLIDAE.

Phasianella affinis C. B. Ad.

Lacuna punctata Gabb, Tr. Amer. Philos. Soc., xv. 1873, p. 240.

The umbilical groove appears slightly deeper, its bounding angle shorter than in recent specimens compared; yet the difference is so small that we have no doubt of the specific identity.

Gabb's type lot, 13 specimens are no. 2820 A. N. S. P.

Eutropia altispira Gabb is a Naticid gastropod.

NERITIDAE.

Smaragdia viridis (L.)

Nerita viridis L., Syst. Nat., x, 778.
Neritina viridis L., Gabb, Tr. Amer. Philos. Soc., xv, p. 242.

The specimens are all small, up to 3.8 mm. long, and show a trace of the green ground color, as well as the linear markings. They are more like European than recent West Indian specimens.

TROCHIDAE.

Tegula viridula (Gmel.)

Omphalius viridulus Gabb, Trans. Amer. Philos. Soc., xv, p. 243.

Calliostoma leve n.n. Text-fig. 32.

Calliostoma conica Gabb, Tr. Amer. Philos. Soc., xv, 1873, p. 243. Not *Trochus conicus* Donovan, also a *Calliostoma*.

Fig. 32. *Calliostoma leve.*

The shell is imperforate and straightly conical. Each whorl has 6 spiral cords, separated by narrow grooves, above the peripheral cord. On the upper whorls these

cords are distinctly beaded by retractive grooves, but the beading is weaker on the last whorl. The flat base has about 12 small smooth cords.

Alt. 5, diam. 4.6 mm., 6 whorls.

Type is no. 2821 A. N. S. P. One specimen.

Solariella (?) tricarinata (Gabb) Text-fig. 33.

Margarita tricarinata Gabb, Tr. Amer. Philos. Soc., xv, p. 243.

This minute shell has three strong coarinae in the peripheral region and rounded beads below the suture and on the umbilical angle. There are some short radial folds external to the latter. The initial $1\frac{1}{2}$ whorls are smooth and rounded. It is obviously a very young shell and possibly belongs to *Liotia*.

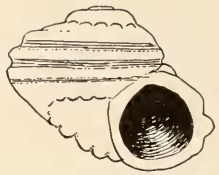


Fig. 33. *Solariella tricarinata.*

Alt. 1.15, diam. 1.4 mm.; 3 whorls.

Type is no. 2836 A. N. S. P.

CYCLOSTREMATIDAE.

Circulus pentagona (Gabb)

Vitrinella pentagona Gabb, Trans. Amer. Philos. Soc., xv, 1873, p. 243; Journ. Acad. N. S. Phila. viii, p. 368, pl. 47, fig. 68.

This species resembles *C. trilix* (Bush), but is much smaller. The unique type measures, alt. 0.9, diam. 1.9 mm.; $3\frac{3}{4}$ whorls. The front part of the last whorl is broken, but shown restored in Gabb's figure.

Type no. 2831 A. N. S. P.

Circulus domingensis Pils. and Johns. Plate XXXVII, figs. 6, 6*a*, 7.

Proc. A. N. S. Phila., 1917, p. 184.

In a smaller, more perfect specimen found among Gabb's duplicates, there are more numerous, smaller spirals within the umbilicus (Plate XXXVII, fig. 7). In the type the ribs are worn on the periphery, hence appear weaker in the figure than in perfect specimens.

Vitrinella (Episcynia) naso (Pils. and Johns.) Plate XXXVII, figs. 5, 5*a*.

Discopsis (?) naso Pils. and Johns., Proc. A. N. S. Phila. 1917, p. 184.

Adeorbis carinata Gabb is thought by Dall to be "probably identical with *Vitrinella (Episcynia) inornata* Orb." (Trans. Wagner Inst. III, 420). This note was overlooked at the time we redescribed the form in 1917. While it is apparently related to that recent species (which we know only by Orbigny's account and figures), we consider it specifically distinct.

Vitrinella (Solariorbis) amosbrowni n. sp. Plate XXXVII, figs. 4, 4*a*.

The shell is perforate, conic, of $4\frac{1}{2}$ rather rapidly increasing, moderately convex whorls, the earlier ones smooth, the penult showing some weak spirals above the suture, the last whorl having about five weak well-spaced spiral cords in the peripheral region, a few still weaker ones traceable above them, and about five smaller, closer spirals below them, occupying all but the central region of the base. Under the compound microscope the surface between the spirals appears densely, irregularly pitted or granose. In the middle part of the base it is finely radially striate and granose. The aperture is somewhat squarish in front view, oblique; the basal lip arches forward a little in a basal view. The peristome is thickened within, the columellar margin strongly so.

Alt. 1, diam. 1.55 mm.

Type no. 4059 A. N. S. P.

Teinostoma angulatum (Gabb) Plate XXXVII, figs. 1, 1*a*, 1*b*.

Cyclops angulatus Gabb, Tr. Amer. Philos. Soc., xv, 1873, p. 214,

The last whorl does not cover the spire completely, as a segment of the suture is exposed, and the rest is visible through the transparent last whorl. There seem to be about $2\frac{1}{2}$ whorls. In the last whorl the suture leaves its former course at a right angle and describes a semicircle to the periphery. The last whorl is angular peripherally in front, but becomes rounded at the end. The dome-like upper surface is covered with very fine spiral striae. The axial callus is large, and formed as in *Umbonium* or *Helicina*.

Alt 1.7, diam. 3.7 mm.

Type no. 2837 A. N. S. P.

This species and the next belong to a section of *Teinostoma* which may be called *Idioraphe*, type *T. angulatum*, characterized by having the whorls enveloping, the suture at first closely coiled, but in the last whorl deviating abruptly. *T. cryptospira* Verrill is an allied recent species. *T. sandomingensis*, which we have not seen, is probably near *T. angulatum*.

Teinostoma depressum (Gabb) Plate XXXVII, figs. 2, 2*a*, 2*b*.

Cyclops depressa Gabb, Tr. Amer. Philos. Soc., xv, p. 214.

In this tiny species the tip of the spire is exposed, the periphery is rounded, and there are no spiral striae.

Alt. 0.65, diam. 1.3 mm.

The single example no. 2830 A. N. S. P., is probably not adult.

We think that the suture might become curved or tangential with further growth.

Teinostoma vitreum (Gabb) Plate XXXVII, figs. 3, 3*a*, 3*b*.

Umbonium vitreum Gabb, Tr. Amer. Philos. Soc., xv, 1873. p. 243.
Parkeria vitrea Gabb, Journ. Acad. Nat. Sci. Phila. viii, p. 368, pl. 47, fig. 69.

This is an *Umbonium*-like shell of $3\frac{3}{4}$ whorls. Faint, close spiral striae may be seen on the upper part of the last whorl under strong magnification. The basal callus is like that of *Helicina*, its outer edge rather indistinct. There is a thick parietal callus somewhat exaggerated in Gabb's figure.

Alt. 1.1, diam. 1.85 mm.

Type no. 2833 A. N. S. P.

This species belongs to the subgenus *Pseudorotella*. It is type of *Parkeria* Gabb, not *Parkeria* Carpenter & Brady, 1869 (Protozoa).

FISSURELLIDAE.

Diadora alternata henekeni Maury.

Lucapina alternata Say, Gabb, Trans. Amer. Philos. Soc., xv, 1873, p. 244.
Fissuridea henekeni Maury, Bull. Amer. Pal. V, p. 157.

The four specimens, no. 3163, differ somewhat from recent *F. alternata*; the concentric cords are closer, rising into higher scales on the radial ribs, and the orifice is relatively a little longer, one-sixth the total length.

SCAPHOPODA.

As the Scaphopoda have been already described and illustrated in a special paper, it is not necessary to repeat the matter here.

Dentalium rudis Gabb, Trans. Amer. Philos. Soc., xv, p. 244, appears to be a worm tube. It has been figured in Proc. A. N. S. Phila., 1897, p. 471, pl. 10, figs. 4, 8.

DENTALIIDAE.

Dentalium cossmannianum Pilsbry and Sharp.

Dentalium cossmannianum Pilsbry & Sharp, Proc. A. N. S. Phila. 1897, p. 467, pl. 10, fig. 11; pl. 11, figs. 10, 11.

Type no. 2709 A. N. S. P.

Dentalium callioglyptum Pilsbry and Sharp.

Dentalium callioglyptum P. and S., Proc. A. N. S. Phila., 1897, p. 468, pl. 10, figs. 11, 12; pl. 11, fig. 21.

Type no. 2713 A. N. S. P.

Dentalium tryoni Pilsbry and Sharp.

Dentalium tryoni P. and S., Proc. A. N. S. Phila., 1897, p. 468, pl. 10, figs. 5, 9; pl. 11, fig. 22.

Type no. 2710 A. N. S. P.

Dentalium dissimile Guppy.

Dentalium dissimile Guppy, Quart. Journ. Geol. Soc., xxii, 1866, p. 292, pl. 17, fig. 4. Pilsbry and Sharp, Proc. A. N. S. Phila., 1897, p. 469, pl. 11, figs. 3, 4. 5.

The specimens are no. 2712 A. N. S. P.

Dentalium dissimile ponderosum Gabb.

Dentalium ponderosum Gabb, Tr. Amer. Philos. Soc., xv, 1873, p. 244.
Dentalium dissimile var. *ponderosum* Gabb, Pilsbry and Sharp, Proc. A. N. S. Phila. 1897, p. 470, pl. 10, figs. 1, 2, 3; pl. 11, figs. 15, 16.

Type no. 2708 A. N. S. P.

Dentalium gabbi Pilsbry and Sharp.

Dentalium affine Gabb, Trans. Amer. Philos. Soc., xv, 1873, p. 244. Not of Deshayes.
Dentalium gabbi P. and S., Proc. A. N. S. Phila., 1897, p. 470, pl. 10, figs. 6, 7, 13; pl. 11, figs. 1, 2.

Type no. 2711 A. N. S. P.

Dentalium haytense Gabb.

Dentalium haytensis Gabb, Trans. Amer. Philos. Soc., xv, 1873, p. 244.
Dentalium haytense Gabb, P. and S., Proc. A. N. S. Phila., 1897, p. 471, pl. 11, figs. 8, 9.

Type no. 2715 A. N. S. P.

Dentalium pyrum Pilsbry and Sharp.

Dentalium pyrum P. and S., Proc. A. N. S. Phila., 1873, p. 472, pl. 11, figs. 6, 7.

Type no. 2714 A. N. S. P.

Dentalium praecursor Pilsbry and Sharp.

Dentalium praecursor P. and S., Proc. A. N. S. Phila. 1873, p. 472, pl. 11, figs. 12, 13, 14.

Type no. 2717 A. N. S. P.

Dentalium sagittarii Pils. and Johns. Plate XVIII, fig. 12.

Proc. A. N. S. Phila., 1917, p. 185.

Dentalium eboreum Conrad (?)

A series of small, very slender Graptacmes, probably none of them mature, is referred provisionally to this recent species.

No. 2882 A. N. S. P.

SIPHONODENTALIIDAE

Cadulus phenax Pilsbry and Sharp.

Gadus dominguensis d'Orb., Gabb, Tr. Amer. Philos. Soc., xv, p. 472.
Cadulus phenax Pils. and Sharp. Proc. A. N. S. Phila., 1897, p. 472, pl. 11, figs. 23, 24.

Type no. 2883 A. N. S. P.

Cadulus elegantissimus Pilsbry and Sharp.

Cadulus elegantissimus P. and S., Proc. A. N. S. Phila., 1897, p. 473, pl. 11, figs. 28, 29, 30.

Type no. 2885 A. N. S. P.

Cadulus depressicollis Pilsbry and Sharp.

Cadulus depressicollis P. and S., Proc. A. N. S. Phila., 1897, p. 473, pl. 11, figs. 25, 26, 27.

Type no. 2884 A. N. S. P.

Cadulus colobus Pilsbry and Sharp.

Cadulus colobus P. and S., Proc. A. N. S. Phila., 1897, p. 474, pl. 11, figs. 17–20.

Type no 2886 A. N. S. P.

PELECYPODA.

NUCULIDAE.

Nucula (Acila) tuberculata Gabb. Plate XXXVIII, fig. 5.

Nucula (Acila) tuberculata Gabb, Trans. Amer. Philos. Soc., xv, 1873, p. 255

The right valve is a trifle larger and its lunule is smaller, that of the left valve being large. The narrow escutcheon is smooth. Posterior dorsal slopes are obliquely corrugated, the rest of the valve tuberculate in the middle and upward, the tubercles obsolete in the lower third, which has sculpture of growth striae and fine, not prominent, radial threads. There are 8 anterior teeth, 16 posterior, in a specimen 6.5 mm. long.

Length 7, alt. 6.2, diam. 4 mm.

Type and numerous separate valves are no. 2658 A. N. S. P.

Nucula tenuisculpta Gabb. Plate, XXXVIII, fig. 6.

Nucula tenuisculpta Gabb, Trans. Amer. Philos. Soc., xv, 1873, p 255.
?Nucula crenulata A. Ad., Dall, "Blake" Pelecypoda, Bull. M. C. Z. xii, no. 6, p. 247; Trans. Wagn. Inst., iii, p. 577.

Dall has identified Gabb's species with the recent *N. crenulata*, which appears to be typically much more coarsely sculptured. As the numerous specimens from Santo Domingo are very uniform in sculpture it seems possible that they form a recognizable race or perhaps a species.

N. tenuisculpta is finely wrinkled concentrically, and radially closely striate, the striae appearing as gray lines, which so far as we can tell are little if at all impressed. Internal border finely crenulated. The largest of numerous valves measures, length 3.35, alt. 2.8 mm.

Gabb's type is no. 2656 A. N. S. P.

Specimens of this species were found in the mud washed out of *Cymatium praefemorale*, no. 3222.

LEDIDAE.

Leda extricata Pils. and Johns. Plate XXXVIII, figs. 1, 1*a*.

Proc. A. N. S. Phila., 1917, p. 185.

Yoldia ovalis Gabb. Text-fig. 34.

Yoldia ovalis Gabb, Trans. Amer. Philos. Soc., xv, 1873, p. 255.

Externally there are some low concentric wrinkles in the lower half of the otherwise smooth valve. Length 8 2, alt. 4.5, diam. of one valve 1.5 mm.

Type no. 3319, a single left valve.

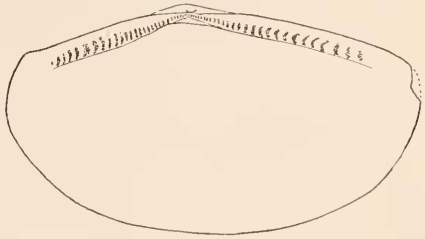


Fig. 34. *Yoldia ovalis* Gabb, Type.

LIMOPSIDAE.

Limopsis ovalis Gabb. Text-fig. 35.

Limopsis ovalis Gabb, Trans. Amer. Philos. Soc., xv, 1873, p. 255.

The sculpture consists of many fine thread-like radii and much

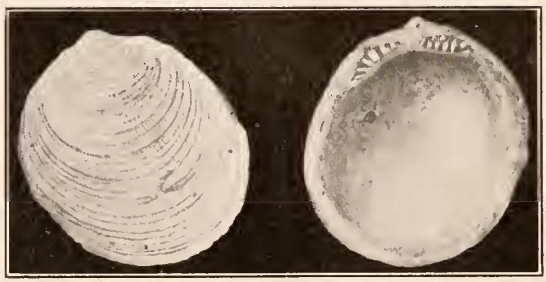


Fig. 35. *Limopsis ovalis* Gabb.

more prominent and coarser, unequal concentric wrinkles. The hinge has 8 teeth on each side of the median hiatus.

Length 9, alt. 9.7, semidiam. 2.5 mm. (Type).

Type is no. 2657 A. N. S. P.

Two smaller valves are nearly circular in outline. It becomes oval with age, as Gabb remarked.

ARCIDAE.

Arca umbonata Lamarck.

Arca imbricata Brug., Gabb, Trans. Amer. Philos. Soc., xv, p. 254.
Arca umbonata Lamarck, Dall, Trans. Wagn. Inst., iii, p. 620.

Characteristic specimens of this well known species are contained in no. 2647.

Arca bonaczyi (Gabb) Plate XXXIX, figs. 1, 2.

Barbatia bonaczyi Gabb, Trans. Amer. Philos. Soc., xv, 1873, p. 254.

This species stands very close to *A. candida* Gmel., and a fuller series may show that it is not separable. It differs by the narrower form and very slight byssal sinuosity, which indeed is not visible in the type valve, though noticeable in a smaller one.

Length 34, alt. 18, diam. of right valve 7 mm.

Type no. 2649 A. N. S. P.

Arca inæquilateralis Guppy.

Arca inæquilateralis Guppy, Q. J. Geol. Soc., xxii, 1866, p. 293, pl. 18, figs. 2*a*, *b*.

Two specimens. It appears to be more abundant in the Bowden bed.

Arca (Scapharca) pennelli Gabb. Plate XXXIX, figs. 3, 4.

A. (Anadara) pennelli Gabb, Trans. Amer. Philos. Soc., xv, 1873, p. 254.

The type, a left valve, has 36 ribs. They are closely granose except at the ends, where granulation is obsolete. The intervals have sharp, irregular transverse striae. The cardinal area is narrow, marked with a few waved longitudinal grooves, and defined by a narrow strong keel. The hinge has a continuous tooth row of 16 and 35 teeth, irregular where the series meet.

Length 36, alt. 27, diam. of left valve 13 mm.

Type is no. 2651 A. N. S. P.

In the right valve of another specimen the ribs are smooth.

Arca (Scapharca) sobrina Pils. and Johns.

Proc. A. N. S. Phila. 1917, p. 186

= *Arca henekeni* Maury.

Arca (Scapharca) copiosa Pils. and Johns.

Proc. A. N. S. Phila. 1917, p. 186.

= *A. margaretæ* Maury.

Arca (Scapharca) devexa Pils and Johns. Plate XLI, figs. 8, 9.

Proc. A. N. S. Phila. 1917, p. 187.

Arca (Scapharca) intumulata Pils. and Johns. Plate XXXIX, figs. 7, 8, 9.

Proc. A. N. S. Phila. 1917, p. 187.

Arca (Scapharca) proletaria Pils. and Johns. Plate XXXIX, figs. 5, 6.

Proc. A. N. S. Phila. 1917, p. 188.

Arca grandis Broderip and Sowerby. Plate XL, fig. 1.

Arca grandis B. and S., Zool. Journ. iv, 1829, p. 365. Reeve, Conch. Icon. ii, pl. 1, fig. 4. Kobelt, Syst. Conch. Cab. p. 41, pl. 12, fig. 1. Carpenter, Rep. B. A. A. S., for 1856, pp. 1, 249, pl. 6, figs. 1–4.

Arca (Anadara) grandis Brod. and Sby., Gabb, Trans. Amer. Philos. Soc., xv, p. 253, in part.

Arca patricia Maury. Bull. Amer. Pal. v, pl. 27.

There are twelve large valves of this species in the Gabb collection from Santo Domingo (no. 2720, 2721), two from 20 miles west of Azua, Haiti, collected by Mr. Lloyd B. Smith (no. 2662), and nine from near Cartagena, Colombia (no. 2661), also taken by Mr. Smith. We formerly thought that the fossils of the Caribbean area were separable from *A. grandis* of the recent Panamic Province, but a close study of all the material shows that no separation can be made.[33]

While somewhat related to *A. chiriquiensis* Gabb, this species differs in shape and by the smaller number of ribs, 24 to 26; *chiriquiensis* having 28 to 30. They are larger, and remain better developed on the posterior dorsal slope. The shell is nearly equivalve, extremely large, solid and heavy, The posterior lower angle is produced, anterior end rounded, basal margin nearly straight. The beaks are extremely large, giving the shell a triangular contour, and projecting far above the hinge. Cardinal area very broad, in form of a nearly symmetrical triangle, being scarcely or not longer posteriorly than in front of the beaks; marked with grooves meeting at a wide angle (but in adults usually eroded, showing the striation derived from growth of the teeth). Sculpture of 25 strong radial ribs, the anterior ones slightly granulated (this is more obvious in the young); the granules, transverse, rather widely and unevenly spaced. Intercostal spaces show rather sharp growth-striae. The

[33]Mr. Gabb reached the same conclusion; but as he included *A. chiriquiensis*, and thought *A. tolepia* the young, his decision has not influenced the opinion expressed above.

It may be noted that J. C. Moore identified *A. grandis*, with some doubt, from Mr. Heneken's second sending of Santo Domingo fossils, in Q. J. Geol. Soc., ix, 1853.

hinge is heavy, set with thin, very close, vertical teeth, the tooth-row being curved down a little at the posterior end. Basal margin very coarsely fluted within.

Length 117, alt. 106, diam. of right valve 56 mm.

Arca chiriquiensis Gabb. Plate XL, figs 2, 3, (Chiriqui), 4–6 (S. Domingo).

Arca chiriquiensis Gabb, Proc. A. N. S. Phila., 1860, p. 567, (1861).
Arca (Scapharca) chiriquiensis Gabb, Dall, Trans. Wagn. Inst., iii, p. 642.
? Arca patricia Sowerby, Q. J. Geol. Soc., vi, 1849, p. 52.

The figures represent a type (Plate XL, fig. 2) and paratype (Plate XL, figs. 3). Plate XLI, figs. 1–3 are other specimens from the blackish shale at Chiriqui. It is equivalve, and the valves are alike except that two or three more of the ribs are granulose in the left valve than in the right. The prominent beaks are moderately to widely separated by a broad, flat cardinal area marked with some angulate grooves. The valves convex before the middle, flattened or even very little concave behind it; about 10 posterior ribs in the left valve, 12 in the right, are nearly smooth, the rest being closely, or sometimes somewhat sparsely, granose. The ribs are weak on the posterior slope. Intervening grooves are irregularly marked with growth striae.

Length 43, alt. 43 mm.; 29 ribs.

Length 40, alt. 34, diam. 36 mm.; 30 ribs.

Length 73, alt. 70 mm.; 31 ribs (largest).

Gabb subsequently considered *A. chiriquiensis* a synonym of *A. grandis*, but it is not even closely related.

The granulation is best developed in young or half-grown examples becoming more or less obsolete in old ones. The degree of separation of the beaks also varies. The lot of about 40 examples from Chiriqui, collected by Dr. John Evans, shows but little other variation.

Santo Domingan specimens (Plate XL, figs 4, 5, 6) are less extensively granose and the beaks are less widely apart than in many of the type lot, though agreeing with others. The concavity behind the middle is slightly more marked. All of the specimens are somewhat worn.

Length 55, alt. 51, diam. of right valve 23 mm.

Length 35, alt. 33, diam. 36 mm.

Besides the above (no. 2722 Gabb Coll., numerous specimens), some fragments were obtained by Mr. W. W. Webster on a stream between Las Caobas and Hinche, Haiti.

It appears likely that this species is the lost *Arca patricia* of

Sowerby, which has also been identified with *A. grandis*. It agrees better than any other Santo Domingan species with the brief and inconclusive diagnosis of that shell. Sowerby states that his species has "rather more numerous" ribs than *A. grandis*, and that it "is much more rounded at the inferior margin", "*margine inferiori rotundato*". As far as it goes, this applies to *A. chiriquiensis*; yet as no definite information on the type specimen is available, the name given by Gabb is preferred, since there is no doubt about its identity.

Arca chiriquiensis websteri Pilsbry. Plate XLI, fig 4.

Arca websteri Pils., Proc. A. N. S. Phila., 1910, p. 488.

This form is more lengthened than *A. chiriquiensis* and more of the ribs are granose; yet it is probably a form of *chiriquiensis*. The type valve is figured.

Length 44, alt. 35, semidiam. 18 mm.

On a stream between Las Caobas and Hinche, Haiti, W.W. Webster.

Type no. 1312 A. N. S. P.

Arca dolaticosta Pils. and Johns. Plate XLI, figs. 5, 6.

Proc. A. N. S. Phila. 1917, p. 188.

Chiriqui.

Arca (Scapharca) coccopleura Pils. and Johns.

Proc. A. N. S. Phila. 1917, p. 188.

= *A. hispaniolana* Maury.

Arca (Argina) tolepia (Dall.).

Scapharca (Argina) tolepia Dall, Trans. Wagn. Inst., iii, p. 649, pl. 33, figs. 7, 8

This is one of the most abundant arks. By Gabb the specimens were referred to *A. grandis* as young. It is somewhat variable. From the adhering material it is evident that several beds are represented.

Three forms seem to be distinguishable, additional to the typical form. Whether these are species, or successive or synchronous mutations of *A. tolepia*, cannot be determined until their stratigraphic place is known.

A. arthurpennelli Maury appears to be based upon part of Gabb's specimens. It may be distinct from *tolepia*, described from Rio Amina.

Arca tolepia saxea Pils. and Johns. Plate XXXIX, fig. 10,

Proc. A. N. S. Phila. 1917, p. 189.

Arca tolepia scapularis Pils. and Johns. Plate XXXIX, figs. 13, 14.
Proc. A. N. S. Phila. 1917, p. 189.

Arca tolepia crassicardinis Pils. and Johns. Plate XXXIX, figs. 11, 12.
Proc. A. N. S. Phila. 1917, p. 189.

Arca cyclica Pils. and Johns. Plate XXXIX, figs. 15, 16.
Proc. A. N. S. Phila. 1917, p. 189.

Arca perfaceta Pils. and Johns. Plate XXXIX, figs. 17, 18, 19, 20.
Proc. A. N. S. Phila. 1917, p. 190.

Arca pomponiana Pils. and Johns. Plate XLII, figs. 4, 5, 6.
Proc. A. N. S. Phila. 1917, p. 190.

Arca multilineata Gabb. Plate XLII, figs. 13, 14.
Arca multilineata Gabb, Trans. Amer. Philos. Soc., xv, 1873, p. 254.

This small, plump shell has triangular rounded contour, the anterior end narrowly, the posterior broadly rounded. Sculpture of many radial ribs crossed by concentric threads over ribs and intervals. In the median fourth the ribs widen towards the basal border and the intervals remain simple, but over the rest of the valve interstitial riblets arise in the intervals, about midway, and many of them become as large as the primary ribs near the basal margin. The cardinal area is narrow and smooth. Tooth row continuous, with 9 and 11 teeth, those of the posterior part strongly oblique, in the anterior part slightly oblique.

Length 10, alt. 9.5, diam. of right valve 4 mm.

Type and three other right valves are no. 2652 A. N. S. P.

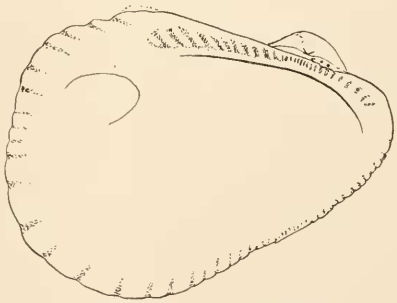


Fig. 36. *Arca maoica.*

Arca maoica Maury. Text-fig. 36.
Arca cuneolus Pils. and Johns., Proc. A. N. S. Phila. 1917, p. 191.

The figure represents the type of *A. cuneolus*, which is apparently a synonym of *A. maoica* Maury.

Arca idiodon Pils. and Johns. Plate XLII, figs. 3, 10.

Proc. A. N. S. Phila. 1917, p. 191.

Wilmington, N. C.

Glycymeris acuticostatus (Sowerby)

Pectunculus acuticostatus Sowerby, Q. J. Geol. Soc., vi, 1849, p. 53, pl. 10, fig. 13.

Axinæa acuticostata Sby., Gabb, Tr. Am. Philos Soc. XV, p. 255.

A very abundant shell. No. 2645 A. N. S. P.

Glycymeris approximans (Gabb) Plate XLII, figs. 7, 11, 13.

Axinæa approximans Gabb, Trans. Amer. Philos. Soc., xv, 1873, p. 255.

A very thin species having about 42 rather strong, rounded ribs, crossed by delicate, equally spaced concentric threads. The hinge is remarkably narrow, but little curved, having 15 short but rather high teeth. Margin with the deeply fluted band very narrow.

Length 8.6, alt. 8.6, diam. of type valve 2.4 mm.

Type and a smaller valve are no. 2650 A. N. S. P.

There is another lot containing much larger but badly worn or broken examples. The largest has an alt. of 21 mm., hinge with about 18 teeth, the row interrupted mesially.

Glycymeris santodomingensis Pils. and Johns. Plate XLII, figs. 12, 18.

Proc. A. N. S. Phila. 1917, p. 192.

Glycymeris diffidentiæ Pils. and Johns. Plate XLII, figs. 8, 9.

Proc. A. N. S. Phila. 1917, p. 192.

PINNIDAE.

Atrina sp. undet.

Pinna sp., Gabb, Trans. Amer. Philos. Soc., xv, 1873, p. 253.

This species has more dorsal ribs than *A. chipolana* Dall. The fragment is scarcely sufficient for specific definition.

PTERIIDAE.

Pteria inornata (Gabb.) Plate XLII. figs. 6, 7.

Avicula inornata Gabb, Trans. Amer. Philos. Soc., xv, 1873, p. 253.

All the specimens are broken. The largest (type) measures 24.7 mm. long, as figured. It is strongly convex. There is also an interval cast no. 2641, which shows the shape much better than the shells (Plate XLII, fig. 7).

Type and numerous imperfect valves, no. 2748 A. N. S. P.

OSTREIDAE.

Ostrea haitensis Sowerby.

Ostrea haitensis Sowb., Q. J. Geol. Soc., vi, 1849, p. 53.
Ostrea haytensis Sby., Gabb, Trans. Amer. Philos. Soc., xv, p. 257.

It attains a length up to $14\frac{1}{2}$ cm.

Ostrea frons L.

O. frons L., Gabb, Trans. Amer. Philos. Soc., xv, p. 258.

Two valves, no. 2639, do not appear distinguishable from the recent mangrove oyster.

Ostrea vaughani insularis Pilsbry and Brown.

Ostrea vaughani insularis Pils. and Brn., Proc. A. N. S. Phila, 1917, p. 40, pl. 6, figs. 1, 1*a*.
Ostrea virginica Gmel., in part, Gabb, Trans. Amer. Philos. Soc., xv, 1873, p. 267.

Type is in no. 2635 A. N. S. P. No. 2634 contains young specimens.

Ostrea cahobasensis Pilsbry and Brown.

Ostrea cahobasensis Pils. and Brn., Proc. A. N. S. Phila. 1917, p. 40, pl. 6, fig. 8.
Ostrea virginica Gmel., Gabb, Trans. Amer. Philos. Soc., xv, 1873, p. 257.

Numerous large and solid valves apparently belong to this species, described from Haiti.

Ostrea bolus Pils. and Johns. Plate XLIII, figs. 2, 3.

Proc. A. N. S. Phila. 1917, p. 192.

ANOMIIDAE.

Anomia sp. undet.

A subcircular valve of 19 mm. diameter in which the muscle impressions are not visible. Externally there is an excessively minute and delicate sculpture of radial striae, visible only near the borders. It is extremely similar to young shells of *Anomia lisbonensis* Aldrich of the same size. The sculpture of the recent *A. aculeata* is far coarser.

Anomia gabbi Pils. and Johns. Plate XLIII, fig. 1.

Proc. A. N. S. Phila. 1917, p. 193.

PECTINIDAE.

A single specimen identified by Gabb as *Pecten magnificus* Sby. (p. 256)appears to be *P. nodosus* L., as Dr. Dall has stated (Trans. Wagn. Inst. III). It retains the color almost as in a living shell. We are much disposed to think that it may be Pleistocene. The

shell was not collected by Gabb personally, and nothing is known of its stratigraphic position.

Doctor Dall has recorded *Pecten cactaceus* Dall from "Tertiary of Santo Domingo, Gabb"; but the species is not represented in this collection. The same is true of *Pecten* (*Plagioctenium*) *gabbi* Dall.

Pecten soror (Gabb) Plate XLIV, figs. 1, 2.

Janira soror Gabb, Trans. Amer. Philos. Soc. xv, 1873., p. 257.

Gabb's description was from right and left valves of two individuals. His measurement is from the concave valve catalogued under no. 2862, which may be considered type. It has about 19 rounded ribs (not counting a few very faint ones on the submargins) parted by wider intervals, the whole elegantly sculptured with close, regular and delicate concentric laminae (fig. 2). Alt. 47 mm.

The convex valve has 23 strong ribs, slightly wider than their intervals, somewhat flattened, and with similar concentric sculpture.

Length 42.5, alt. 40.5, convexity 14.5 mm.

There are also valves of several smaller individuals showing the same characters.

Pecten thetidis Sowerby. Plate XLIV, figs. 3, 6.

Pecten thetidis Sowb., Q. J. Geol. Soc., vi, 1849, p. 52. Not *Pecten* (*Aequipecten*) *thetidis* Sowerby, Dall, Trans. Wagn. Inst. iii, p. 714.

Pecten eugrammaticus Dall, Trans. Wagn. Inst. iii, p. 712, pl. 34, fig. 2.

The characteristic sculpture of this species has been well though briefly described by Sowerby, in terms which preclude the identification of *thetidis* with a species of the *exasperatus* group, by Guppy and Dall.

The shell is rather convex, slightly inequilateral, with 21 ribs separated by V-shaped furrows. Except near the ends the ribs are square-topped, having flat or furrowed summits and more or less flange-like edges bearing unequal asperities. There is a beautiful sculpture of fine, nearly regular concentric threads over the furrows and slopes of the ribs. Submargins nearly or quite ribless. Ears are small, and have about 5 slender ribs. No ctenolium.

Length and alt. 24 mm.

The species here defined and figured is the only one in the large series which agrees with the Sowerby diagnosis. Gabb's collection covered the ground where the Heneken shells were obtained, and contains practically all of the Heneken species, so that it may fairly be inferred that the only species fulfilling the requirements of the original diagnosis is the true *thetidis*. It is not an uncommon shell,

and varies rather widely in the degree of development of the rib-ornamentation.

In a form of this species which may be called *Pecten thetidis pelei* (Plate XLIV, figs. 4, 5) the ribs have wider summits, more strongly developed spinose flanges, and on the slopes of the ribs there are one or two spinose riblets. The submargins and ears have a close sculpture of spinose riblets. Alt. and length 28, semidiam. 11 mm.

Type no. 2853 A. N. S. P.

Pecten plurinominis Pils. and Johns. Plate XLV, figs. 1, 2.

Proc. A. N. S. Phila. 1917, p. 193.

Pecten scissuratus Dall.

Pecten (Aequipecten) scissuratus Dall, Trans. Wagn. Inst. iii, p. 715, pl. 34, fig. 4. Brown and Pilsbry, Proc. A. N. S. Phila., 1911, p. 364, pl. 28, figs. 2, 5.

The sculpture is highly developed in this species.

Pecten interlineatus Gabb. Plate XLV, fig. 3.

Pecten interlineatus Gabb, Trans. Amer. Philos. Soc., xv, 1873, p. 256.

On the left valve there are 15 or 16 rounded and not very high major ribs, a riblet running in each interval; close to the base there are two or three in each interval. Anterior submargin with about six riblets, posterior ribs and riblets are granose. The anterior ear has few fine riblets, posterior ear coarse ribs. There is a fine concentric sculpture of regular hair-lines, but more or less wholly worn from the summits of the ribs. The right valve is a trifle less convex with the same sculpture except that both ears have fine riblets. Four well-developed teeth in the short ctenolium.

Length 23, alt. 24.7, diam. 7.2 mm.

Type no. 2856 A. N. S. P.

Pecten oxygonum Sowerby. Plate XLV, figs. 4, 5, 6.

Pecten oxygonum Sowb., Q. J. Geol. Soc., vi, 1849, p. 52.

A series of 26 valves seems to be referable to Sowerby's species. Doctor Dall has shown that neither of the specimens now preserved in the typical tray of Sowerby's collection agree with the diagnosis.

The 18 or 19 ribs have either distinctly angular or very narrowly rounded summits. There are fine, thread-like concentric striae. Submargins plain. The left valve is more convex than the right. There is no ctenolium.

Length and alt. 26.3, convexity 7.2 mm. (Left valve figured).

Peten augusticostatus Gabb, Plate XLV, figs. 7, 8.

Pecten augusticostatus Gabb, Trans. Amer. Philos. Soc. xv, 1873, p. 256.

The sole specimen of this species is a left valve. It has 22 ribs. These are very high and acute, in section like an inverted V. Their slopes and intervals have an extremely fine, regular raised concentric striation. The anterior submargin has several very low ribs, and there are a few delicate riblets on the adjacent ear.

Length 24.3, alt. 23.8, convexity 8 mm.

Type no. 2866 A. N. S. P.

While this species is closely related to the preceding, it should be retained distinct until connecting specimens are found. It differs by the more numerous, far sharper ribs, the low ribs on the anterior submargin, the greater convexity, and the finer concentric striation.

There cannot be much doubt that the name as printed is an error for *angusticostatus*. Gabb was in Costa Rica when his paper was printed, and did not see the proofs.

Pecten uselmæ Pils. and Johns. Plate XLV, fig. 9.

Proc. A. N. S. Phila. 1917, p. 194.

Bowden, Jamaica. Type no. 11124 A. N. S. P.

Pecten inaequalis Sowerby. Plate XLV, fig. 11.

Pecten inaequalis Sowerby, Q. J. Geol. Soc., vi, 1849, p. 52. Not *P. inaequalis* of Guppy or of Dall.

This is an abundant *Aequipecten* in the collection. It is nearly equilateral, distinctly inequivalve. There are rounded ribs and concave intervals in both valves, the ribs in the left valve as wide as the intervals, in the right valve decidedly narrower. The greatest number of specimens have 19 ribs; many have 20 and the extremes, represented by a few, are 18 and 22 ribs. A very fine concentric sculpture of hair-like threads runs over both ribs and intervals, but is usually a good deal worn.

Length 38.5, alt. 37.3 mm.

The figures represent both valves of one individual. So far as we know, the species has been found only in Santo Domingo.

Pecten eccentricus Gabb. Plate XLV, fig. 12.

Pecten eccentricus Gabb, Trans. Amer. Philos. Soc., xv, 1873, p. 256.

Pecten (Plagioctenium) excentricus Gabb, Dall, Trans. Wagn. Inst., iii, p. 717.

This species is distinctly inequilateral. The type has 21 ribs, separated by wide, rather shallow intervals, and sculptured with very fine, close concentric threads, mainly lacking anteriorly. The

narrow tops of the ribs are a little flattened. Ears wanting in the type. It is a good deal like the right valve of *P. inaequalis* except that it is inequilateral.

Length 32, alt. 30 mm.

Type no. 2854 A. N. S. P.

Pecten (Amusium?) correctus Pils. and Johns. Plate XLV, fig. 13.

Pecten opercularis Gabb, Trans. Amer. Philos. Soc., xv, 1873, p. 256.
Pecten correctus Pils. and Johns. Proc. A. N. S. Phila. 1917, p. 194.

Pecten ischnon Pils. and Johns. Plate XLIV, figs. 7, 8 (type), 9.

Proc. A. N. S. Phila. 1917, p. 194.

The concentric lineolation appears to be confined to the more convex valve.

Amusium papyraceum Gabb Plate XLIII, figs. 8, 9.

Pleuronectia papyracea Gabb, Trans. Amer. Philos. Soc., xv, 1873, p. 257.

Smooth, with unsculptured beaks. The flatter valve is gently convex in the middle, with a broad, shallow concavity on each side. The type measures: Alt. 52, length 54 mm.

Type no. 2864 A. N. S. P.

SPONDYLIDAE.

Spondylus bostrychites Guppy.

Spondylus bifrons Sowerby, Q. J. Geol. Soc., vi, p. 53. Not of Goldfuss, 1835.
Spondylus bostrychites Guppy, Proc. Sci. Soc., Trinidad 1867, p. 176. Gabb, Trans. Amer. Philos. Soc., xv, p. 257. Dall, Trans. Wagn. Inst., iii, p. 758; Bull. 90, U. S. N. M. p. 124.

Abundant, and in fine preservation.

Spondylus gumanomocon Brown and Pilsbry. Plate XLIII, figs. 4, 5.

Spondylus americanus Lam., Gabb, Trans. Amer. Philos. Soc., xv, p. 257.
Spondylus gumanomocon Brown and Pilsbry, Proc. A. N. S. Phila., 1912, p. 514, footnote 4.

Type no. 2869 A. N. S. P.

A ponderous, very large species. The figures are much reduced.

Plicatula gibbosa Lamarck (variety).

Plicatula cristata Lam., Gabb, Trans. Amer. Philos. Soc., xv, 1873, p. 257.

The single perfect specimen reported by Gabb appears to be identical with this common recent species, except that in places *fine radial striation* or crinkling may be seen under the lens. No color markings are preserved.

DIMYACIDAE.

Dimya grandis Dall.

Dimya grandis Dall, Proc. U. S. Nat. Mus., xix, p. 328, with var. *divaricata*; Trans. Wagn. Inst., iii, p. 764, pl. 35, fig. 8.

Three valves of the typical form and two of var. *divaricata* were found among unassorted oyster valves.

MYTILIDAE.

Modiolaria sp. undet.

Modiola sp. Gabb, Trans. Amer. Philos. Soc., xv, 1873, p. 252.

Two very small valves (length about 3.25 mm), belong apparently to the typical section of *Modiolaria*.

Modiolus sp. undet.

An internal cast, found with the following species.

Lithophaga antillarum Orbigny.

Lithodomus corrugatus Phil., Gabb, Trans. Amer. Philos. Soc., xv, 1873, p. 253.

These mussels were preserved in their burrows. They appear typical of the species.

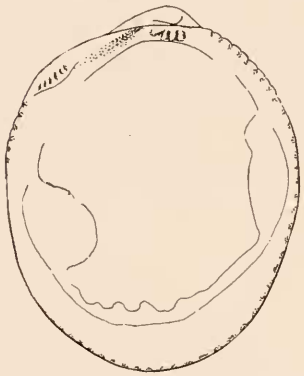


Fig. 37. *Crenella diuturna.*

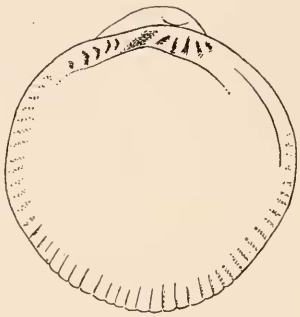


Fig. 38. *Crenella rota.*

Crenella diuturna Pils. and Johns. Text-fig. 37; Plate XXXVIII, fig. 7.

Proc. A. N. S. Phila. 1917, p. 195.

Crenella rota Pils. and Johns. Text-fig. 38.

Proc. A. N. S. Phila. 1917, p. 195.

PANDORIDAE.

Pandora inconspicua Gabb. Plate XXXVIII, figs. 8, 9.

Pandora inconspicua Gabb, Trans. Amer. Philos. Soc. xv, 1873, p. 248.

Convex (fig. 8) and flat (fig. 9) valves are photographed. The former is selected as type; length 7, alt. 3.3 mm.

Type and paratypes are no. 2676 A. N. S. P.

CUSPIDARIIDAE.

Cuspidaria ornatior Pils. and Johns. Plate XXXVIII, figs. 11, 12.

Proc. A. N. S. Phila. 1917, p. 195.

Cuspidaria gabbi Pils. and Johns. Plate XXXVIII, fig. 10.

Proc. A. N. S. Phila. 1917, p. 195.

Very similar to *C. islahispaniolæ* Maury, but the figure of that shows a longer rostrum.

CRASSATELLITIDAE.

Crassatellites reevei (Gabb).

Crassatella antillarum Reeve? (*C. reevei* Gabb), Gabb, Trans. Amer. Philos. Soc., xv, 1873, p. 252.

Crassatellites reevei Gabb, Brown and Pilsbry, Proc. A. N. S. Phila. 1912, p. 515, pl. 23, fig. 5.

Type is no. 2687 A. N. S. P.

Crassatellites (Crassinella) guppyi radiata n. subsp. Plate XXXVIII, fig. 4.

The shell is similar to *C. guppyi* Dall in having narrow concentric ribs (twelve in number in the type), and in having a distinct microscopic concentric striation over ribs and intervals, but it differs from Bowden *guppyi* compared by having a fine, even radial striation, barely visible under a good hand lens, the striae impressed, cutting the concentric striation and passing over ribs and intervals.

Length 3.55, alt. 3.35, semidiam. 0.9 mm.

Type no. 3994 A. N. S. P.

Crassatellites (Crassinella) microdelta Pils. and Johns. Text-fig. 40.

Proc. A. N. S. Phila. 1917, p. 196.

Crassatellites (Crassinella) dolatus Pils. and Johns. Text-fig. 39.

Proc. A. N. S. Phila. 1917, p. 196.

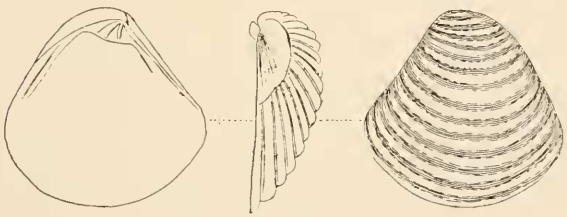


Fig. 39. *Crassatellites dolatus.*

Fig. 40. *C. microdelta.*

Venericardia aversa Pils. and Johns. Plate XLV, fig. 10.

Proc. A. N. S. Phila. 1917, p. 196.

Venericardia santodomingensis Pils. and Johns. Plate XLV, fig. 14.

Proc. A. N. S. Phila. 1917, p. 197.

CHAMIDAE.

Chama chipolana Dall.

Chama macrophylla Chemn., Gabb, Trans. Amer. Philos. Soc., xv, 1873, p. 251.

Chama chipolana Dall, Trans. Wagn. Inst., iii, p. 1398; Bull. U. S. Nat. Mus. 90, p. 135, pl. 25, figs. 9, 11.

One characteristic valve.

Chama tampaensis Dall.

Chama tampaensis Dall, Trans. Wagn. Inst., iii, 1903, p. 1398, pl. 54, fig. 6; Bull. 90, U. S. N. M., p. 135, pl. 24, fig. 1.

One specimen, the valves together, agrees with Tampa examples.

Chama involuta Guppy.

Chama involuta Guppy, Geol. Mag. Dec. ii, vol. i, 1874, p. 444, pl. 17, figs. 5*a–c*.

Five characteristic valves, like Guppy's fig. 5*c*, and agreeing with Bowden examples.

This and the two preceding species were labelled *Chama macrophylla* in the Gabb collection. They have been compared carefully with numerous specimens from type localities of the respective species.

Echinochama yaquensis trachyderma Pils. and Johns. Plate XLVI, figs. 1, 2.

Echinochama trachyderma P. and J., Proc. A. N. S. Phila. 1917, p. 197.

Echinochama antiquata Dall, Maury, Bull. Amer. Pal. V, pl. 33, fig. 10.

A smaller form with fewer, less prominent radial ribs has been named *Echinochama antiquata* var. *yaquensis* Maury. A few of these are in the Gabb collection. The larger form with more ribs which we named *trachyderma* should apparently be called *C. yaquensis trachyderma*.

Type 2786 A. N. S. P.

LUCINIDAE.

Phacoides riocanensis Maury.

Lucina jamaicensis Chemn., Gabb, Trans. Amer. Philos. Soc., xv, p. 251.

Three fine specimens (no. 2666), the largest with an altitude of of 84 mm. Very close to *P. hillsboroensis* (Heilpr.).

Phacoides perplexus Pils. and Johns. Text-fig. 41. Plate XXXVIII, fig. 3.

Phacoides perplexus Pils. & Johns., Proc. A. N. S. Phila. 1917, p. 197.

Lucina antillarum Reeve, Gabb, Trans. Amer. Philos. Soc., xv, p. 251.

This species has fewer radial ribs than *P. actinus* Dall, and their intervals are quite shallow. The lunule in the left valve is semicordiform, being about half as wide as long.

Phacoides (Parvilucina) pupulus Pils. and Johns. Text-fig. 42; Plate XXXVIII fig. 2.
Phacoides (Parvilucina) pupulus P. & J., Proc. A. N. S. Phila. 1917, p. 198.
Lucina crenulata Con., Gabb, Trans. Amer. Philos. Soc., xv, p. 251.
Phacoides (Lucinisca) muricatus (Spengler)
Lucina tigerina Linn., Gabb, Trans. Amer. Philos. Soc., xv, p. 251.
Phacoides (Lucinisca) muricatus Spengler, Dall, Trans. Wagn. Inst., iii, p. 1373.

Six specimens, no. 3162, appear to us identical with this recent species.

Phacoides (Parvilucina) yaquensis (Gabb)
Lucina yaquensis Gabb, Trans. Amer. Philos. Soc., xv, 1873, p. 251.
Phacoides (Parvilucina) yaquensis Gabb, Dall, Trans. Wagn. Inst., iii, p. 1382.

The sculpture is of delicate, raised, concentric lines and almost obsolete radials. Length 3.8, alt. 3.5 diam. of a right valve 1.2 mm. Type no. 2772 A. N. S. P. There are many other valves in the lot.

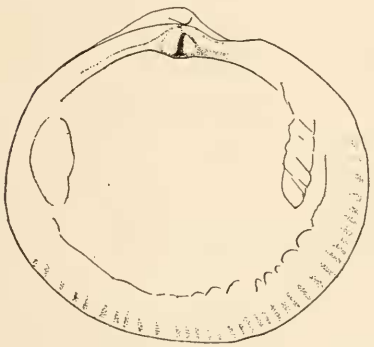


Fig. 41. *Phacoides perplexus* P. and J.

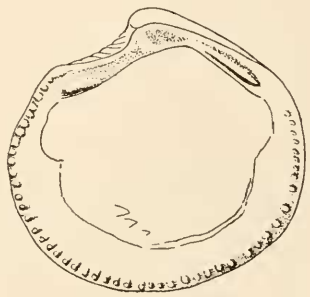


Fig. 42. *Phacoides pupulus* P. and J.

Lucina janus Dall.
Lucina janus Dall, Trans. Wagn. Inst., iii, p. 1353, pl. 51, fig. 9.

A number of specimens show variation in degree of inflation, but none are so nearly spherical as *L. corpulenta* Dall. I have had the advantage of a comparison with the Chipolan type by Doctor Dall.

Lucina mauryæ Pils. and Johns. Plate XLVI, fig. 3.

Proc. A. N. S. Phila. 1917, p. 198.

The dimensions of the type should be, length 36.3, alt. 33.5, diam. 18.5 mm. It becomes a little larger.

Lucina bulla (Gabb) Plate XLVI, fig. 6.
Cardium (Serripes) bulla Gabb. Trans. Amer. Philos. Soc., xv, 1873, p. 251.

The somewhat prosogyrate beaks are a little in front of the middle. There is an extremely narrow and small lunule. The surface is somewhat roughened by growth-lines; on the posterior and anterior

slopes the rugosity is greater. Posteriorly a few minute short wrinkles run more obliquely towards the basal margin. In suitable light, very weak traces of radial sculpture are discernible. It was probably very little alate in front of the beaks, but the shell is broken away there.

Length 44, alt. 40, diam. 23.7 mm.

Type no. 2763 A. N. S. P.

The type is an excellent specimen except for some breakage of the anterior margin. The hinge is not visible, but the characters, so far as shown, are those of a Lucinid shell and not of a *Cardium*.

There is also a broken and distorted specimen.

Divaricella proletaria Pils. and Johns. Plate XLII, fig. 1, 2.

Divaricella proletaria P. & J., Proc. A. N. S. Phila. 1917, p. 198.
Lucina dentata Wood, Gabb, Trans. Amer. Philos. Soc., xv, p. 251.

D. prevaricata Guppy is of the same size, but according to Dall's figure of the type (Proc. U. S. N. Mus., XIX, plate XXX, fig. 4) it has closer divaricating grooves.

DIPLODONTIDAE.

Diplodonta (Phlyctiderma) gabbi Dall. Text-fig. 43.

Mysia subquadrata Gabb, Trans. Amer. Philos. Soc., xv, 1873, p. 252. Not *Diplodonta subquadrata* Carpenter, P. Z. S., 1855, p. 230.
D. [*iplodonta*] *gabbi* Dall, Trans. Wagn. Inst., iii, p. 1183, footnote.
Diplodonta (*Phlyctiderma*) *puncturella* Dall, *t. c.*, p. 1183.

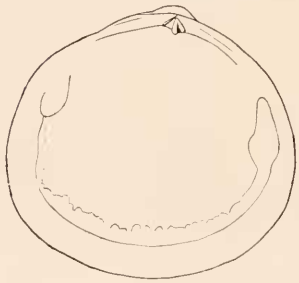


Fig. 43. *Diplodonta gabbi* Dall. Type.

Externally this species has an extremely minute, irregular but dense punctation, the pits more or less anastomosing, forming a sort of network where most perfectly preserved. There is some variation in contour, some examples having the anterior end less rounded than that figured. The largest valve (figured) measures, length 5.6, alt. 5.4, diam. 1.65 mm.

Type is no. 2693 A. N. S. P.

We have not compared specimens of the Bowden *D. puncturella* Dall, which from the description and figure appears not to differ from *gabbi*. Dall had not seen the latter, apparently.

Diplodonta dedecoris n. sp. Text-fig. 44*d.e.*

Proc. A. N. S. Phila. 1917, p. 198.

Diplodonta (Sphærella) capuloides (Gabb) Text-fig. 44a, b, c.

Mysia capuloides Gabb, Trans. Amer. Philos. Soc., xv, 1873, p. 252.

The shell is much inflated, with sculpture of very minute, but well developed concentric striae. Beaks large and prominent. The right anterior and posterior cardinal teeth are both bifid. The edge of the valve is noticeably reflected upward above the cardinal teeth.

Length 5.2, alt. 5, semidiam. 2.4 mm.

Type and two paratypes no. 2694 A. N. S. P. All are right valves. On account of the inflated form and peculiar hinge this species appears to belong to the subgenus *Sphærella* Conrad.

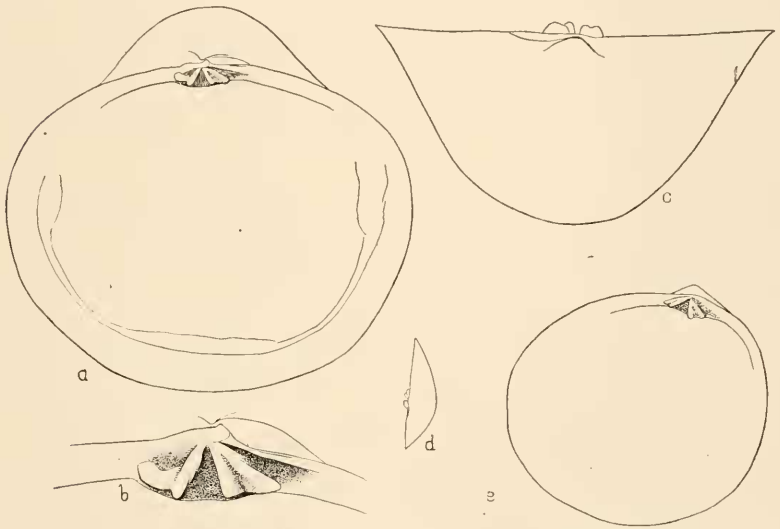


Fig. 44. a, b, c. *Diplodonta capuloides* Gabb; d, e, *D. dedecoris* P. and J.

SPORTELLIDAE.

Sportella lioconcha Dall.

Sportella lioconcha Dall, Trans. Wagner Inst., iii, p. 1128, pl. 44, fig. 24 (Oligocene sands of Oak Grove, Florida).

A valve agreeing with this species measures, length 11.5, alt. 8, semidiam. 2.6 mm.

Neæromya quadrata (Gabb) Text-fig. 45a–e.

Neæromya quadrata Gabb, Trans. Amer. Philos. Soc., xv, 1873, p. 247; Proc. A. N. S. Phila. 1872, p. 274, pl. 10, figs. 4, 1*a*, 4*b*.

Neæromya (=*Erycina*) *quadrata* Gabb, Dall, Trans. Wagner Free Inst. Sci., iii, pt. 5, p. 1140, 1143.

Besides some fragments, there are in Gabb's type lot three specimens showing the hinge. Two of these, the originals of Gabb's figures

1*a*, 4*b*, are redrawn. The valve shown in fig 45 *a*, *b*, *c*, may be taken as type of the species and genus. The lateral teeth described and figured by Gabb do not exist, the surfaces where they would stand being flat. The hinges of small Leptonid bivalves are hard to make out, and we attribute Gabb's mistake to the use of a low-power hand lens, instead of the compound microscope.

The external surface shows an extremely minute radial rugosity, or irregular lineolation, under high magnification. Concentric sculpture is very slight. The prodissoconch has a circular outline, like that of *Sportella* (fig. *e*).

Length 6.2, alt. 4.2 mm. (Fig. 45 *a*).

It is plain that the species is not a typical *Erycina;* the hinge being more like *Pseudopythina* or *Sportella*. Not being expert in the study of Leptonacea, the species is left under the original generic name.

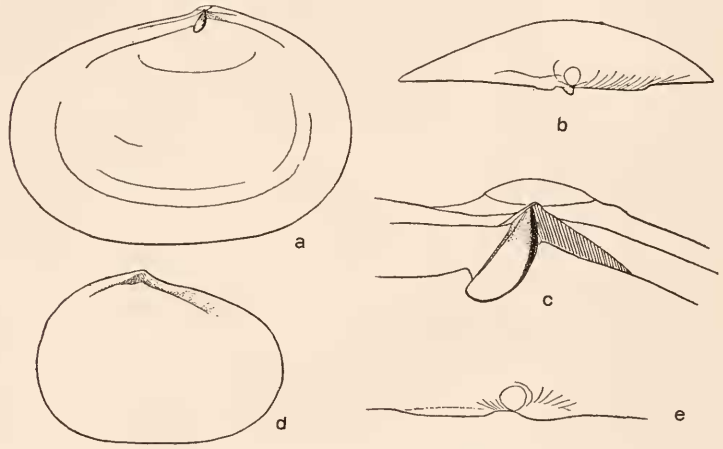


Fig. 45. *Neæromya quadrata* Gabb, a, b, interior and dorsal views of right valve, type; c, enlarged cardinal detail of same; d, e, interior and dorsal views of a smaller left valve.

Type no. 2787 A. N. S. P.

CARDIIDAE.

We may note in this connection that by a typographical error *Cardium durum* was spelled *durun* in Proc. A. N. S. Phila. 1912, p. 516. It was correctly spelled on pp. 501 and 519.

Cardium (Trachycardium) domincanum Dall.

Cardium (*Trachycardium*) *dominicanum* Dall, Trans. Wagn. Inst., iii, p. 1082, pl. 48, fig. 16.

C. (*Trachycardium*) *subelongatum* Sby., Gabb, Trans. Amer. Philos. Soc., xv, p. 250.

Cardium (Trachycardium) dominicense Gabb. Plate XXV, figs. 8, 9.

Cardium dominicense Gabb, Trans. Amer. Philos. Soc., xv, 1873, p. 250; Journ. A. N. S. Phila. viii, p. 344. Pilsbry and Brown, Proc. A. N. S. Phila., 1911, p. 367 (Gatun).

The ribs, except on the posterior slope, are smooth and rounded, separated by narrow grooves. On the anterior end the ribs show small erect processes or the scars where they have been. There are also quite small processes along the posterior sides of the rest of the ribs, nearly all worn off. On the posterior area each rib is split, alternate ones of the resulting riblets bearing erect, oblique processes. The posterior end is deeply serrate, each primary rib projecting. There are about 54 primary ribs.

The whole basal margin is broken away, so that the true length does not show in the figure. The type measures: length 38, alt. 44 (estimated), diam. of one valve 15 mm.

Several young shells are more rounded in outline, and the ribs are very closely spinose towards the margins. The posterior ribs show only a trace of splitting. (No. 2769 A. N. S. P.).

Type no. 2764 A. N. S. P.

Cardium linguatigris Maury appears to resemble this species rather closely.

Cardium tintinnabularum Maury.

One imperfect valve.

Cardium (Trigoniocardia) haitense Sowerby.

Cardium haitense Sowerby, Q. J. Geol. Soc., vi, 1849, p. 52, pl. 10, fig. 11.
C. (Fragum) haitense Sby., Gabb, Trans. Amer. Philos. Soc., xv, p. 251.

Cardium (Laevicardium) serratum L.

Cardium (Laevicardium) serratum L., Dall, Trans. Wagn. Inst., iii, p. 1112.

Not recorded by Gabb, who left the specimens without name. They are rather small, alt. 23 mm., but characteristic.

Cardium (Laevicardium) venustum Gabb. Plate XXV, figs. 2, 7.

C. (Laevicardium) venustum Gabb, Trans. Amer. Philos. Soc., xv, 1873, p. 251.

The shell is longer than high, transversely oval, with very convex, but somewhat narrow and markedly prosogyrate beaks, which project far more above the hinge outline than in *C. serratum*. The anterior and posterior areas are smooth, the median portion finely ribbed, the ribs low, flattened, much wider than the intervals, which are closely and finely striated transversely. There are about 50 ribs. The right anterior cardinal tooth is peg-like, higher than the posterior. Lateral teeth compressed, the posterior, especially, much thinner than in *C. serratum*.

Length 33, alt. 31, diam. of one valve 13 mm.

Type no. 2768 A. N. S. P.

This species has been placed in the synonymy of *C. serratum*, but it seems to me distinct by the far larger beaks, of a different shape, and the differences in the teeth. In *C. serratum* the beaks are much wider and lower, even in specimens of far greater size. The sculpture described may possibly be due to disintegration of the outer layer, though we see no evidence that this is the case.

VENERIDAE.

Macrocallista (Chionella) maculata (L.)

M. (C.) maculata L., Dall, Trans. Wagn. Inst., iii, p. 1256.

Agrees closely with recent specimens externally. As the valves are together the interior could not be compared.

Macrocallista (Chionella) planivieta (Guppy)

Cytherea (Callista) planivieta Guppy, Q. J. Geol. Soc., xxii, 1866, p. 292, pl. 18, fig. 3.

Callista planivicta Guppy, Gabb, Trans. Amer. Philos. Soc., xv, 1873, p. 250.

One typical right valve (no. 2670).

Pitar tryonianus (Gabb) Plate XLVII, fig. 11.

Callista tryoniana Gabb, Trans. Amer. Philos. Soc., xv, 1873, p. 250.

This shell is not unlike the recent *P. fulminata* Mke. (*varians* Hanley), but is thinner, a little plumper, with the beaks turned forward a little more. The sculpture is of very fine, close, even and smooth concentric threads, which are flattened and wider in the median part, where unworn; the beaks smooth in the median convexity. The lunule is defined by a weakly impressed line.

Length 28, alt. 23.3, semidiameter 8.4 mm.

Type no. 2757 A. N. S. P.; a left valve.

Cf. *Pitaria cercadica* Maury, which appears to be the same species.

The emendation of *Pitar* into *Pitaria* was an arbitrary proceeding. There are many non-Latin generic and specific names which might equally well be changed to give them a Latin dress.

Pitar (Hyphantosoma) carbaseus (Guppy)

Cytherea (Circe) carbasea Guppy, Q. J. Geol. Soc., xxii, 1866, p. 292, pl. 18, fig. 13.

Callista carbasea Guppy, Gabb, Trans. Amer. Philos. Soc., xv, 1873, p. 250.

Pitaria (Hyphantosoma) carbasea Guppy, Dall, Trans. Wagn. Inst., iii, p. 1266.

Six specimens contained in trays no. 2664 and 2679.

Pitar (Lamelliconcha) acuticostatus (Gabb) Plate XLVII, fig. 10.

Callista acuticostata Gabb, Tr. Amer. Philos. Soc. xv, 1873, p. 250.

The sculpture consists of close, nearly equal, thin concentric ribs

of which every second one rises lamina-like at the anterior end. The lunule is quite small, marked by a rather weak impressed line. The pallial sinus is horizontal, rounded at the end, and reaches beyond the middle of the length.

Length 25.5, alt. 22, semidiameter 7.2 mm.

Type is no. 2776 A. N. S. P., a left valve. A series of smaller valves is contained in no. 2775.

This shell is shorter and more acutely sculptured than *P. concinnus* Sowb.

Cytherea (Antigona) tarquinia (Dall)

Venus magnifica Hanley, Gabb, Tr. Amer. Philos. Soc. xv, p. 259.
Venus tarquinia Dall, Trans. Wagn. Inst., iii, p. 1194, pl. 38, fig. 2. (Ballast Point, Florida).
Cytherea tarquinia Dall, *t. c.* p. 1274.
Antigona tarquinia Dall, U. S. Nat. Mus., 90, p. 147.

Fine specimens, up to a length of 77 mm. It is probably ancestral to the recent *C. listeri*, in which the concentric sculpture is much more strongly developed.

While *Cytherea magnifica* is related, it differs by the wider, flatter radial striae.

Chione (Lirophora) paphia (L.)

Chione pappia Linn., Gabb, Trans. Amer. Philos. Soc., xv, 1873, p. 249.
? Chione (Lirophora) hendersonii Dall, Trans. Wagn. Inst., iii, p. 1295.

Five valves, no. 2669. We cannot distinguish them from the recent species. Numerous specimens from Jamaica (no. 11041), which are apparently referable to *C. hendersonii* Dall, do not seem to be specifically distinct.

Chione santodomingensis Pils. and Johns. Plate XLVII, figs. 1, 2.

Proc. A. N. S. Phila. 1917, p. 199.

Chione socia Pils. and Johns. Plate XLVII, figs. 12, 13.

Proc. A. N. S. Phila. 1917, p. 199.

Chione primigenia Pils. and Johns. Plate XLVII, figs. 6, 7.

Proc. A. N. S. Phila. 1917, p. 199.

Chione guppyana Gabb. Plate XLVII, figs. 3, 4, 5.

Chione guppyana Gabb, Trans. Amer. Philos. Soc., xv, 1873, p. 249.

A peculiarity of this species is that the ventral faces of some or all of the concentric lamellae have about twice as many ribs as there are in the intervals. This is shown in the detail photographed in fig. 4. It is a rather plump, rounded shell, related to *C. woodwardi* Guppy.

Length 31.3, alt. 30 mm. Type no. 2773.

Length 32.5, alt. 29, diam. 22.3 mm.

Cytherea (Ventricola) blandiana (Guppy)

Chione circinata Born, Gabb, Trans. Amer. Philos. Soc., xv, p. 250.
Venus blandiana Guppy, Geol. Mag. Dec. 11, vol. i, 1874, p. 444, pl. 17, fig. 8.
Cytherea (Ventricola) blandiana Guppy, Dall, Trans. Wagn. Inst., iii, p. 1277.

This fine species reaches a length of 43 mm. Guppy's figure is very inadequate.

Cyclinella cyclica domingensis Pils. and Johns. Plate XLVII, fig. 8.

Proc. A. N. S. Phila. 1917, p. 200.

Dosinia azuana Pils. and Johns. Plate XLVII, fig. 9.

Proc. A. N. S. Phila. 1917, p. 200.

TELLINIDAE.

Tellina sp. undet.

? Tellina punicea Born, Gabb. Trans. Amer. Philos. Soc., xv, 1873, p. 248.

An imperfect internal cast in a hard rock, no. 2788, resembles this species in outline but is more convex. It was not labelled, but may possibly represent Gabb's *T. punicea*. No specimens were found under that name in the collection.

Tellina (Eurytellina) n. sp.

A weakly grooved left valve, which has been broken into several pieces and repaired, apparently belongs to an undescribed species. It is no. 3200 A. N. S. P.

Tellina alternata Say.

Tellina alternata Say, Gabb, Trans. Amer. Philos. Soc., xv, p. 248.

There is a set of *T. alternata* in the collection labelled "U. S." possibly from Santo Domingo or Costa Rica, but without Gabb's MS. label. We cannot, therefore, confirm or reject Gabb's record. This and *T. punicea* are the only species mentioned by Gabb which we have not been able to trace in the collection.

Tellina minuta Gabb. Text-fig. 46a, b.

Tellina (Peronæoderma) minuta Gabb, Trans. Amer. Philos. Soc., xv, 1873, p. 249.

The shape is subcircular rather than "suboval". Left valve without lateral teeth, and a little plumper than the right. Externally there are very fine, evenly spaced concentric lines with flat intervals, much as in *T. alternata* except that the sculpture is very flat and superficial. It is quite thin, and the internal impressions are faint.

Length 5.5, alt. 4.75 mm.

Type no. 2789 A. N. S. P.

Semele delimata Pils. and Johns. Plate XLVI, fig. 9.

Proc. A. N. S. Phila. 1917, p. 200.

Semele firma Pils. and Johns. Plate XLVI, fig. 10.

Proc. A. N. S. Phila. 1917, p. 200.

Tellina (Merisca) errati Pils. and Johns. Plate XLI, fig. 7.

Proc. A. N. S. Phila. 1917, p. 201.

Tellina (Moerella) simpsoni Dall.

T. (M.) simpsoni Dall, Trans. Wagn. Inst. iii, p. 1024, pl. 46, fig. 12.

According to Dall, "this form is what Gabb identified as *T. cuneata* d'Orb." but in the vial labelled *T. cuneata* (no. 2663) we find only a worn valve of some Erycinid form.

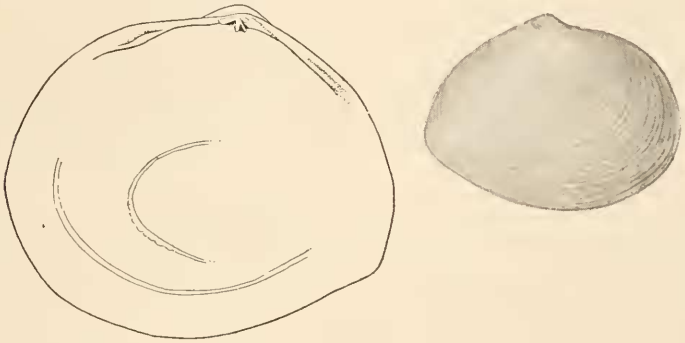


Fig. 46. *Tellina minuta* Gabb; inside and exterior of the type valve.

Tellina (Cyclotellina) fausta Donovan.

T. (Arcopagia) fausta Don., Gabb, Trans. Amer. Philos. Soc., xv, p. 249.

The outside of a single almost perfect specimen (no. 2695) does not differ materially from this recent species. As the valves are closed, no details of the interior are accessible.

Metis efferta Pils. and Johns.

Proc. A. N. S. Phila. 1917, p. 201.

Metis chipolana Dall (?). Plate XLVI, fig. 7.

Metis chipolana Dall, Trans. Wagn. Inst., iii, 1900, p. 1042, pl. 47, fig. 21.
Tellina (Macoma) constricta Brug., Gabb, Trans. Amer. Philos. Soc., xv, p. 249.

A single Santo Domingan example (no. 2671) differs from the type by having the posterior end broader, the radial striation is less distinct, and the concavity of the right valve more extensive; yet we do not think it specifically separable. Length 37.3, alt. 32, diam. 15 mm.

Metis postrema Pils. and Johns.

Proc. A. N. S. Phila. 1917, p. 201.

Strigilla pisiformis (L.)

Strigilla pisiformis Linn., Gabb, Trans. Amer. Philos. Soc. XV, p. 249.

Abundant.

DONACIDAE.

Donax aequalis Gabb. Text-fig. 47.

Donax aequalis Gabb, Trans. Amer. Philos. Soc., xv, 1873, p. 249.

Fig. 47. *Donax æqualis* Gabb.

The shell is unusually equilateral for this genus. The type, a right valve, measures, length 7.8, alt. 5.5, semidiameter 2 mm. No. 2668 A. N. S. P.

SOLENIDAE.

Siliqua subaequalis Gabb. Text-fig. 48.

S. subaequalis Gabb, Trans. Amer. Philos. Soc., xv, 1873, p. 247.

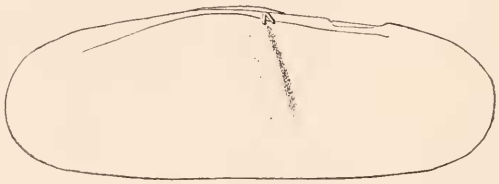


Fig. 48. *Siliqua subæqualis* Gabb.

This shell is extremely delicate and fragile. The rather strong internal rib extends two-thirds of the distance to the lower border.

Length 19, alt. 7, semidiameter 1.5 mm.

Type and four other valves no. 2677 A. N. S. P.

MACTRIDAE.

Mactra dariensis Dall.

Mactrella alata Spengler, Gabb, Trans. Amer. Philos., Soc., xv, p. 248.

Two specimens in hard gray rock, one an internal cast, the other retaining part of the shell, seem to be referable to this species described from the Oligocene of the Canal Zone. The best specimen has the sharp grooves on both sides of the beaks described by Dall, and the shape agrees well.

Gabb's identification was evidently hasty, as little resemblance to *M. alata* can be traced.

Labiosa (Raeta) gabbi. Pils. and Johns. Plate XLVI, fig. 1a.

Proc. A. N. S. Phila. 1917, p. 202.

CORBULIDAE.

Corbula vieta Guppy.

Corbula disparilis d'Orb., Gabb, Trans. Amer. Philos. Soc., xv, p. 247.
Corbula vieta Guppy, Quart. Journ. Geol. Soc., xxii, p. 580, pl. 26, fig. 8. Dall, Trans. Wagn. Inst. iii, p. 849.
Erycina tensa Guppy, Q. J. Geol. Soc., xxii, p. 582, pl. 22, fig. 6, (left valve). Gabb. Trans. Amer. Philos. Soc., xv, p. 252.

Gabb considered *vieta* to be identical with *disparilis;* the resemblance is certainly great, but according to Dr. Dall, the small differential features are constant.

Corbula sericea Dall.

Corbula lavaleana d'Orb., Gabb, Trans. Amer. Philos. Soc., xv, p. 247.
Corbula sericea Dall, Tr. Wagn. Inst., iii, p. 848, pl. 36, fig. 8.

Corbula knoxiana fossilis n. subsp. Plate XLVI, fig. 14.

Corbula contracta Say, Gabb, Trans. Amer. Philos. Soc., xv, 1873, p. 247. Not of Say.

The specimens agree well in form with *C. knoxiana* C. B. Ad. except that the carina projects decidedly less. The type, a right valve, measures length 8.7, alt. 6, diam. 3 mm.

Type no. 2689 A. N. S. P.

Corbula dominicensis Gabb. Plate XLVI, figs. 12, 13.

Corbula dominicensis Gabb, Trans. Amer. Philos. Soc., xv, 1873, p. 247.

The right valve is slightly larger. Sculpture of concentric ribs, abrupt on their upper edges, sloping on the lower. On the posterior half the number of ribs is nearly doubled, by splitting. In the left valve the ribs are simple throughout, not split posteriorly.

Ridge to the sharp posterior angle is acute.

Length 14.6, alt. 9, diam. 6 mm.

Type is no. 2691 A. N. S. P.

Corbula (Bothrocorbula) viminea Guppy.

Bothrocorbula viminea Guppy, Gabb, Trans. Am. Philos. Soc., xv, p. 247.
Bothrocorbula viminea Guppy, Gabb, Proc. A. N. S. Phila. 1872, p. 274, pl. 10, figs. 3, 3*a*.

The specimens agree well with those of the Bowden bed.

GASTROCHAENIDAE.

Rocellaria sp. undet.

Rocellaria sp.? Gabb, Trans. Amer. Philos. Soc., xv, p. 246.

Two minute valves about 3 mm. long scarcely permit identification of species, though showing presence of the genus. No. 2678.

PHOLADIDAE.

Martesia sanctipauli Maury.

Martesia sp. indet. Gabb, Trans. Amer. Philos. Soc., xv, p. 246.

An imperfect valve is apparently referrable to *M. sanctipauli*. The length of the specimen as broken is 3.7 mm. No. 2672 A. N. S. P.

TEREDINIDAE.

Teredo (Kuphus) incrassata (Gabb)

Kuphus incrassatus Gabb, Trans. Amer. Philos. Soc., xv, 1873, p. 249; Journ. A. N. S. Phila., viii, 1881, p. 342, pl. 44, figs. 12 *a–c*.

Type lot is no. 2785 A. N. S. P.

Teredo sp. undet.

? Teredo sp. undet., Gabb, Trans. Amer. Philos. Soc., xv, 1873, p. 246.

Two groups of tubes about 10 mm. in diameter, in hard rock.

Explanation of Plates XVI-XLVII.

Drawings, photographs and retouching by Helen Winchester. The line figures in the text were drawn by the author.

Plate XVI.—Fig. 1, 2.—*Drillia macilenta* Dall. Length 37.5 mm. and 44 mm.
Fig. 3.—*Drillia consors* Sowb. Length 41.5 mm.
Fig. 4, 5.—*Drillia squamosa* Gabb. Type. Length 56.5 mm.
Fig. 6.—*Drillia callistopleura* Pils. & Johns. Type. Length 22.4 mm.
Fig. 7, 8.—*Drillia winchesterae* n. sp. Type. Length 26.3 mm.
Fig. 9.—*Drillia elocata* n. sp. Type. Length 25.4 mm.
Fig. 10, 11.—*Clathurella gracilis* Gabb. Type. Length 28.3 mm.
Fig. 12.—*Drillia callistura* Gabb. Type. Length 21.7 mm.
Fig. 13.—*Drillia mimula* Pils. & Johns. Type. Length 16.7 mm.
Fig. 14.—*Drillia subgibbosa* Pils. & Johns. Cotype. Length 46 mm.
Fig. 15.—*Drillia ischnatracta* Pils. & Johns. Type. Length 53.4 mm.
Fig. 16, 17.—*Drillia scala* Pils. & Johns. Type. Length 45.4 mm.
Fig. 18.—*Drillia esculenta* Pils. & Johns. Type. Length 13.2 mm.
Fig. 19.—*Drillia orthopleura* Pils. & Johns. Type. Length 13.7 mm
Fig. 20.—*Drillia foveolata* Pils. & Johns. Type. Length 14.1 mm.
Fig. 21.—*Drillia parkeri* Gabb. Type. Length. 26.8 mm.

Plate XVII.—Fig. 1.—*Turris rara* Gabb. Type.
Fig. 2.—*Surcula longicaudata* (Gabb). Type.
Fig. 3.—*Drillia henekeni* (Sowb.).
Fig. 4, 5.—*Surcula humerosa* (Gabb). Type and paratype.
Fig. 6.—*Drillia sororcula* Pils. & Johns. Type.
Fig. 7.—*Drillia gatunensis alia* n. subsp. Type.
Fig. 8.—*Drillia fusiformis* (Gabb). Type.
Fig. 9.—*Cythara heptagona* (Gabb). Type.
Fig. 10.—*Cythara polygona* (Gabb). Type.
Fig. 11, 12.—*Clavatula labiata* Gabb. Type and paratype.
Fig. 13.—*Clathurella amica* Pils. & Johns. Type.
Fig. 14.—*Drillia venusta* (Sowb.).
Fig. 15.—*Glyphostoma dentiferum* Gabb. Type.
Fig. 16.—*Scobinella magnifica* (Gabb). Type.
Fig. 17, 18.—*Scobinella tristis* Pils. & Johns. Back and face of type.
Fig. 19, 20.—*Borsonia varicosa* Gabb. Views of opposite sides of the summit of a quite perfect paratype.
Fig. 21.—*Borsonia varicosa* Gabb. Type.

Plate XVIII.—Fig. 1.—*Drillia hexapleura* Pils. & Johns. Type. No. 2908.
Fig. 2.—*Borsonia recurvirostris* Gabb. Type. Length 9.6 mm.
Fig. 3.—*Cythara elevata* (Gabb). Type. No. 3224.
Fig. 4.—*Clathurella paupercula* (Gabb). Type.
Fig. 5.—*Drillia lissotropis dorsuosa* Pils. & Johns. Type.
Fig. 6.—*Cythara elongata* (Gabb). Type. No. 2917.
Fig. 7.—*Odostomia dulcis* Pils. & Johns. Type.
Fig. 8.—*Anachis (?) quadrata* (Gabb). Type. Length 8.7 mm.
Fig. 9.—*Strombina caribæa* Gabb. Type.
Fig. 10, 11.—*Strombina caribæa micra* Pils. & Johns. Type.
Fig. 12.—*Dentalium sagittarii* Pils. & Johns. Type.
Fig. 13.—*Anachis exilis* (Gabb). Type.
Fig. 14.—*Columbella inflata* (Gabb). Type. Length 25.6 mm.
Fig. 15.—*Strombina politissima* Pils. & Johns. Type.
Fig. 16.—*Metulella fusiformis* Gabb. Type. Length 18.5 mm.
Fig. 17.—*Anachis gracilicostata* Pils. & Johns. Type. No. 2803.
Fig. 18.—*Metulella dominicensis* Pils. & Johns. Type. Length 16.4 mm

Plate XIX.—Fig. 1.—*Conus haytensis* Sowb. Length 107 mm.
Fig. 2.—*Conus recognitus* Guppy. Length 69 mm.
Fig. 3.—*Conus bonaczyi* Gabb. Type. Length 21.5 mm.
Fig. 4.—*Conus longitudinalis* Pils. & Johns. Type. Length 35 mm.
Fig. 5.—*Conus haytensis politispira* n. subsp. Type. Length 65 mm.
Fig. 6.—*Conus trisculptus* Pils. & Johns. Type. Length 34½ mm.
Fig. 7.—*Conus domingensis* Sowb. Length 89 mm.

Plate XX.—Fig. 1.—*Conus furvoides* Gabb. Type. Length 44.5 mm.
Fig. 2, 2*a*, 2*b*, *Conus symmetricus* Sowb. Lengths 25, 27.5 and 49 mm.
Fig. 3.—*Conus furvoides brachys* Pils. & Johns. Type. Length 37.5 mm.
Fig. 4.—*Conus aratus* Gabb. Type. Length 63 mm.
Fig. 5.—*Conus perlepidus* Pils. & Johns. Type. Length 44 mm.
Fig. 6.—*Conus planiliratus* Sowb. Length 32 mm.
Fig. 7, 7*a*, 7*b*,.—*Conus consobrinus* Sowb. Length 27, 30 and 50 mm.
Fig. 8.—*Conus consobrinus ultimus* Pils. & Johns. Type. Length 52 mm.
Fig. 9.—*Conus planiliratus* Sowb. var. Length 42 mm.
Fig. 10.—*Conus cercadensis* Maury. (*porcellus* Pils. & Johns. Type). Length 29 mm.
Fig. 11, 11a.—*Conus xenicus* Pils. & Johns. Type and paratype. Lengths 28.5 and 27 mm.

Plate XXI.—Fig. 1.—*Conus stenostoma* Sowb. Length 75 mm.
Fig. 2.—*Conus strombiformis* Gabb. Type. Length 63 mm.
Fig. 3.—*Conus simplicissimus* Pils. & Johns. Type. Length 63 mm.
Fig. 4.—*Conus proteus humerosus* n. subsp. Type. Length 65 mm.
Fig. 5.—*Conus simplicissimus* n. subsp. Length 68 mm.
Fig. 6.—*Conus yaquensis* Gabb. Type. Length 49 mm.
Fig. 7.—*Conus pernodosus* Pils. & Johns. Type. Length 23 mm.
Fig. 8, 9.—*Conus gabbi* Pils. & Johns. Paratype and type. Lengths 33 and 42.5 mm.
Fig. 10.—*Conus larvatus* Pils. & Johns. Type. Length 33 mm.

Plate XXII.—Figs. 1, 2.—*Terebra hitia* Pils. & Johns., with detail of penult whorl.
Figs. 3, 4.—*Conus catenatus* Sowb. Lengths 65 and 28 mm.
Figs. 5, 6.—*Terebra baculiformis* Pils. & Johns., with detail of penult whorl.
Fig. 7.—*Cancellaria guppyi* Gabb. Type.
Figs. 8, 9.—*Cancellaria ellipsis* Pils. & Johns. Type and paratype.
Figs. 10, 14.—*Phos costatus* Gabb. Type and paratype. Lengths 31 and 30.5 mm.
Fig. 11.—*Cancellaria insularis* Pils. & Johns. Type.
Fig. 12.—*Cancellaria gabbiana* Pils. & Johns. Type.
Fig. 13.—*Cancellaria epistomifera* Guppy. Length 37 mm.
Fig. 14.—*Phos costatus* Gabb.
Fig. 15.—*Nassaria brevis* Gabb. Type. Length 20 mm.
Fig. 16, 17, 18.—*Phos guppyi* Gabb. Type and paratypes. Lengths 31.5, 28, 33.5 mm.
Figs. 19, 20.—*Metula cancellata* Gabb. Type. Length 24.5 mm.
Figs. 21, 22.—*Sureula jacquensis* (Gabb). Type and paratype. Lengths 45 and 67.3 mm.
Figs. 23, 24, 25. *Phos semicostatus* Gabb. Lengths 33.5, and 34. mm. Fig. 23 is the type.

Plate XXIII.—Fig. 1.—*Oliva proavia* Pils. & Johns. Type.
Figs. 2, 3.—*Oliva cylindriea* Sowb. Lengths 35 and 31 mm.
Fig. 4.—*Oliva brevispira* Gabb. Type.
Fig. 5.—*Olivella canaliculata* Gabb. Type. (=*muticoides* var.).
Fig. 6.—*Olivella muticoides* Gabb, intermediate form. Length 17. 3 mm.
Fig. 7.—*Olivella muticoides* Gabb. Type.
Fig. 8.—*Oliva dimidiata* Pils. & Johns. Type.
Fig. 9.—*Aurinia striata* Gabb. Type.

Figs. 10, 11.—*Oliva gradata* Gabb. Paratype and type.
Fig. 12.—*Rictaxis oryza* (Gabb). Type. Length 6.7 mm.
Fig. 13.—*Harpa americana* n. sp. Type.
Fig. 14.—*Marginella sowerbyi* Gabb. Type.
Fig. 15.—*Acteon subtornatilis* Pils. & Johns. Type.

Plate XXIV.— Fig. 1.—*Mitra symmetrica* Gabb. Type (=*titan* Gabb). Length 51 mm.
Fig. 2.—*Mitra titan* Gabb. Type. Length 106 mm.
Fig. 3.—*Mitra longa* Gabb. Type. Length 61.3 mm.
Figs. 4, 5.—*Mitra rudis* Gabb. Type and a young specimen.
Fig. 6.—*Plochelæa crassilabrum* Gabb. Type.
Fig. 7.—*Plochelæa gabbi* Pils. & Johns. Type. Length 27.5 mm.
Fig. 8.—*Vexillum tortuosum* (Gabb). Type. Length 32.3 mm.
Fig. 9.—*Vexillum tortuosellum* (Pils. & Johns.). Type.
Fig. 10.—*Mitra mesolia* Pils. & Johns. Type.
Fig. 11, 12.—*Lyria soror* (Sowerby).
Fig. 13.—*Vexillum tortuosellum frater* (Pils. & Johns.). Type.
Fig. 14.—*Marginella nugax* Pils. & Johns. Type.

Plate XXV.—Fig. 1.—*Latirofusus exilis* (Gabb). Length 31.4 mm.
Fig. 2.—*Cardium venustum* Gabb. Type.
Fig. 3.—*Xancus validus* (Sowb.). Length 178 mm.
Fig. 4.—*Latirus brevicaudatus santodomingensis* P. Length 57 mm.
Fig. 5.—*Xancus textilis jamaicensis* Pils. & Johns. Length 123 mm.
Fig. 6.—*Xancus textilis jamaicensis*. Length 42 mm.
Fig. 7.—*Cardium venustum* Gabb. Type.
Fig. 8, 9.—*Cardium dominicense* Gabb. Type.

Plate XXVI.—Fig. 1.– *Latirus angustatus* Gabb. Length 27 mm.
Fig. 2.—*Latirus fusiformis* Gabb. Length 31.5 mm.
Fig. 3.—*Latirus fusiformis* Gabb. Length 28.7 mm.
Fig. 4.—*Latirus elongatus* Gabb. Length 49 mm.
Fig. 5.—*Xancus rex* Pils. & Johns. Length 220 mm.
Figs. 6, 7.—*Fusinus henekeni* (Sowb.). Lengths 71 and 89 mm.
Fig. 8.—*Xancus rex* Pils. & Johns. Length 156 mm.
Fig. 9.—*Leucozonia rhomboidea* Gabb. Length 13.6 mm.

Plate XXVII.—Fig. 1.—*Vasum pugnus* Pils. & Johns. Length 80 mm.
Figs. 2, 3.—*Vasum tuberculatum* Gabb. Length 112 mm.
Figs. 4, 5.—*Vasum dominicense* Gabb. Lengths 32 and 60 mm.
Fig. 6.—*Aclis alta* Gabb. Type.

Plate XXVIII.—Fig. 1.—*Murex rufus compactus* Gabb. Type. Length 56.4 mm.
Figs. 2, 3.—*Trophon dominicensis* Gabb. Type. Length 17.5 mm.
Fig. 4.—*Murex textilis* Gabb. Type. Length 31 mm.
Figs. 5, 6.—*Typhis obesus* Gabb. Type. Length 24.8 mm.
Fig. 7.—*Muricidea striata* Gabb. Type Length 12.3 mm.
Figs. 8, 9.—*Thais santodomingensis* Pils. & Johns. Type. Length 45 mm.
Fig. 10.—*Melongena antillarum* (Gabb). Young paratype. Length 43.7 mm.
Figs. 11, 12. *Cymia henekeni tectiformis* n. subsp. Type. Length 46 mm.
Figs. 13, 14.—*Melongena orthacantha* Pils. & Johns. Type. Length 29.6 mm.
Figs. 15, 16.—*Melongena orthacantha* Pils. & Johns. Adult paratype. Length 36.4 mm.
Fig. 17.—*Melongena antillarum* Gabb. Type. Length 79 mm.

Plate XXIX.—Figs. 1, 9.—*Malea goliath* Pils. & Johns. Type. Length 129 mm.
Fig. 2.—*Cymatium domingense* (Gabb). Type. Length 28.7 mm.
Fig. 3.—*Malea elliptica* Pils. & Johns. Type. Length 53.5 mm.
Fig. 4, 5.—*Bursa crassa proavus* Pils. Length 25 mm.
Figs. 6, 7.—*Potamides dentilabris* (Gabb). Length 49.6 mm.
Fig. 8.—*Bursa crassa bowdenensis* Pils. Length 48.7 mm.

Fig. 9.—*Malea goliath* Pils. & Johns. Back of type.
Figs. 10, 11.—*Potamides suprasuleatus* (Gabb). Lengths 29.5 and 20.5 mm.
Fig. 12.—*Potamides prismaticus* (Gabb). Length 57.5 mm.

Plate XXX.—Figs. 1, 2, 3.—*Cypræa raymondrobertsi* n. sp. Type. Length 27 mm.
Fig. 4, 5.—*Cypræa spurcoides* Gabb. Type. Length 32.5 mm.
Fig. 6.—*Cypræa raymondrobertsi bowdenensis* n. subsp. Type. Length 25.5. mm.
Figs. 7, 8.—*Cypræa dominicensis* Gabb. Type. Length 39 mm.
Figs. 9, 10.—*Cypræa campbelliana* Pils. & Johns. Type. Length 30 mm.
Figs. 11, 12.—*Capulus inornatus* Gabb. Type. Length 14 mm.
Fig. 13.—*Orthaulax inornatus* Gabb. Young specimen 30 mm. long.
Fig. 14.—*Orthaulax inornatus* Gabb. Largest specimen. Length 91.3 mm.
Fig. 15.—*Orthaulax inornatus* Gabb. Type. Length 55 mm.
Fig. 16.—*Orthaulax i. altilis* n. subsp. Young specimen 27 mm. long.
Figs. 17, 18.—*Orthaulax i. altilis* n. subsp. Type. Length 52 mm.
Figs. 19, 20.—*Hipponix otiosa* Pils. & Johns. Type and a small specimen; the upper left margin of the peristome broken in the former. Length 9.2 and 5 mm.

Plate XXXI.—Figs. 1, 2.—*Strombus galliformis* Pils. & Johns.
Figs. 3, 4.—*Xenophora imperforata* Gabb. Type.
Fig. 5.—*Melongena consors* (Sowb.). Dwarf form.

Plate XXXII.—Fig. 1.—*Strombus dominator* Pils. & Johns. Type.
Figs. 2, 3.—*Cerithium microlineatum* Gabb. Type and paratype. Length 49 and 50 mm.
Fig. 4.—*Cerithium venustum* Gabb. Type. Length 29 mm.
Figs. 5, 6.—*Potamides gastrodon* Pils. & Johns. Type. Length 22.5 mm
Figs. 7, 8.—*Xenophora dilecta* Guppy. Diam. 51 and 56 mm.
Fig. 9.—*Strombus dominator* Pils. & Johns. Type.

Plate XXXIII.—Figs. 1, 2.—*Cerithium turricula* Gabb. Type.
Figs. 3, 4.—*Cerithium dominicense* Gabb. Type.
Figs. 5, 6.—*Cerithium obesum* Gabb. Type.
Fig. 7.—*Cerithium simplex* Gabb. Type.
Fig. 8.—*Cerithium turricula* Gabb.
Figs. 9-12.—*Cerithium obesum ventricosior* n. var. 10–12 are the type.
Figs. 13, 17.—*Cerithium obesum gurabense* Maury. No. 4076.
Figs. 14, 15.—*Cerithium obesum harrisi* n. var. Type.
Figs. 16, 20.—*Cerithium uniseriale* Sowb. No. 2595.
Fig. 17.—*Cerithium obesum gurabense* Maury.
Figs. 18, 19.—*Cerithium obesum ventricosum* (?). No. 4075.
Fig. 20.—*Cerithium uniseriale* Sowb. Enlarged view of No. 2595.

Plate XXXIV.—Fig. 1.—*Rissoina minuta* (Gabb). Type.
Fig. 2.—*Bittium costatum* Gabb. Type. =*Rissoina bryerea* (Mont.), var. *binominis* Pils. & Johns.
Figs. 3, 4.—*Eulima crassilabris* Gabb. Type (=*Rissoina laevigata* C. B. Ad.).
Fig. 5.—*Rissoa epulata* Pils. & Johns. Type.
Fig. 6.—*Rissoa proavita* Pils. & Johns. Type.
Fig. 7.—*Epitonium amosbrowni* n. sp. Type.
Figs. 8, 9.—*Epitonium santodomingense* n. sp. Type.
Figs. 10, 11.—*Epitonium minutissimum* (Gabb). Type.
Figs. 12, 13.—*Dolophanes melanoides* Gabb. Type. (=*Crepitacella*).
Figs. 14 – 16.—*Hemisinus truncatus* (Gabb). Fig. 14, 36 mm. long.
Fig. 17.—*Niso grandis* (Gabb). Type.
Figs. 18, 19, 20.—*Torinia rotundata* Gabb.
Fig. 21.—*Natica finitima* Pils. & Johns. Type.
Fig. 22.—*Epitonium amplum* Gabb. Type. Diam. 13.5 mm.

Figs. 23. 24.—*Amauropsis burnsi meridionalis* n. subsp. Length 23.3 mm.
Figs. 25–27.—*Amauropsis guppyi* (Gabb). Lengths 32, 28, 38 mm.

Plate XXXV.—Fig.1.—*Mangilia dominicensis* (Gabb). Type.
Fig. 2.—*Alabina canaliculata* (Gabb). Type.
Fig. 3.—*Alabina angustior* n. sp. Type.
Fig. 4.—*Bittium asperoides* (Gabb). Type.
Fig. 5.—*Aclis bartschiana* Pils. & Johns. Type.
Fig. 6.—*Melanella gabbiana* Pils. & Johns. Type.
Fig. 7.—*Melanella astuta* Pils. & Johns. Type.
Fig. 8.—*Strombiformis ischnon* Pils. & Johns. Type.
Fig. 9.—*Strombiformis sarissiformis* Pils. & Johns. Type.
Fig. 10.—*Strombiformis prælubrica* Pils. & Johns. Type.
Fig. 11.—*Alaba maocnsis* (Gabb). Type.
Fig. 12.—*Bittium yaquense* (Gabb). Type.
Fig. 13.—*Pyramidella forulata famelica* Pils. & Johns. Type.
Fig. 14.—*Pyramidella canaliculata* Gabb. Type.

Plate XXXVI.—Fig. 1.—*Turbonilla turritelloides* Gabb. Type.
Fig. 2.—*Turbonilla beatula* Pils. & Johns. Type.
Fig. 3.—*Turbonilla dominicensis* Gabb. Type.
Fig. 4.—*Turbonilla santodomingensis* Pils. & Johns. Type.
Fig. 5.—*Turbonilla galeata* Pils. & Johns. Type.
Fig. 6.—*Turbonilla peræqua* Pils. & Johns. Type.
Fig. 7.—*Turbonilla angustula* Pils. & Johns. Type.
Fig. 8.—*Turbonilla aratibacillum* Pils. & Johns. Type.
Fig. 9.—*Turbonilla insititia* Pils. & Johns. Type.
Fig. 10.—*Turbonilla undecimcostata* Pils. & Johns. Type.
Fig. 11.—*Turbonilla pertenuis* Gabb. Type.
Fig. 12.—*Turbonilla contexta* Pils. & Johns. Type.
Fig. 13.—*Turbonilla egressa* Pils. & Johns. Type.
Fig. 14.—*Odostomia cyclocephala* Pils. & Johns. Type.
Fig. 15.—*Odostomia bartschiana* Pils. & Johns. Type.
Fig. 16.—*Odostomia mogindo* n. sp. Type.

Plate XXXVII.—Figs. 1, 1*a*, 1*b*.—*Teinostoma angulatum* (Gabb). Type.
Figs. 2, 2*a*, 2*b*.—*Teinostoma depressum* (Gabb). Type.
Figs. 3, 3*a*, 3*b*.—*Teinostoma vitreum* (Gabb). Type.
Figs. 4, 4*a*.— *Vitrinella amosbrowni* n. sp. Type.
Figs. 5, 5*a*.—*Vitrinella naso* Pils. & Johns. Type.
Fig. 6. 6*a*.—*Circulus domingensis* Pils. & Johns. Type.
Fig. 7.—*Circulus domingensis* Pils. & Johns. Base of a more perfect specimen.

Plate XXXVIII.—Fig. 1, 1*a*.—*Leda extricata* Pils. & Johns. Type.
Fig. 2.—*Phacoides pupulus* Pils. & Johns. Type.
Fig. 3.—*Phacoides perplexus* Pils. & Johns. Type.
Fig. 4.—*Crassinella guppyi radiata* n. subsp. Type.
Fig. 5.—*Nucula tuberculata* Gabb. Type.
Fig. 6.—*Nucula tenuisculpta* Gabb. Type.
Fig. 7.—*Crenella diuturna* Pils. & Johns. Type.
Figs. 8, 9. *Pandora inconspicua* Gabb. Type and paratype.
Fig. 10.—*Cuspidaria gabbi* Pils. & Johns. Type.
Fig. 11.—*Cuspidaria ornatior* Pils. & Johns., variety.
Fig. 12.—*Cuspidaria ornatior* Pils. & Johns. Type.

Plate XXXIX.—Figs. 1, 2.—*Arca bonaczyi* (Gabb). Type.
Figs. 3, 4.—*Arca pennelli* Gabb. Type.
Figs. 5, 6.—*Arca proletaria* Pils. & Johns. Type.
Figs. 7, 8, 9.—*Arca intumulata* Pils. & Johns. Type and paratype.
Fig. 10.—*Arca tolepia saxea* Pils. & Johns. Type.

Figs. 11, 12.—*Arca tolepia crassicardinis* Pils. & Johns. Type.
Figs. 13, 14.—*Arca tolepia scapularis* Pils. & Johns. Type.
Figs. 15, 16.—*Arca cyclica* Pils. & Johns. Type.
Figs. 17, 18, 19, 20. *Arca perfaceta* Pils. & Johns. Type and another specimen.

Plate XL.—Fig . 1.—*Arca grandis* Brod. Santo Domingo. No. 2720.
Figs. 2, 3.—*Arca chiriquiensis* Gabb. Chiriqui. Type and paratype.
Figs. 4, 5, 6.—*Arca chiriquiensis* Gabb. Santo Domingo. No. 2722.

Plate XLI.—Figs. 1, 2, 3.—*Arca chiriquiensis* Gabb. Chiriqui. No. 2724.
Fig. 4.—*Arca c. websteri* Pils. Type.
Figs. 5, 6.—*Arca dolaticosta* Pils. & Johns. Type.
Fig. 7.—*Tellina errati* Pils. & Johns. Type.
Fig. 8, 9.—*Arca devexa* Pils. & Johns. Type.

Plate XLII.—Figs. 1, 2.—*Divaricella proletaria* Pils. & Johns. Type.
Figs. 3, 10.—*Arca idiodon* Pils. Type. Wilmington, N. C.
Figs. 4, 5, 6.—*Arca pomponiana* Pils. & Johns. Type and paratype.
Figs. 7,—*Glycymeris approximans* Gabb. Type. Alt. 8.6 mm.
Figs. 8, 9.—*Glycymeris diffidentiæ* Pils. & Johns. Type.
Fig. 10.—*Arca idiodon* Pils. Type.
Fig. 11.—*Glycymeris approximans* Gabb. Large specimen, alt. 21 mm.
Figs 12, 18.—*Glycymeris santodomingensis* Pils. & Johns. Type.
Figs. 13, 14.—*Arca multilineata* Gabb. Type.
Fig. 15.—*Turritella sulcigyrata* Pils. & Johns. Type.
Figs. 16, 17. *Turbo dominicensis* Gabb. Type and paratype.
Fig. 18.—*Glycymeris santodomingensis* Pils. & Johns. Type.

Plate XLIII.—Fig. 1.—*Anomia gabbi* Pils. & Johns. Type.
Figs. 2, 3.—*Ostrea bolus* Pils. & Johns. Type and paratype.
Figs 4, 5.—*Spondylus gumanomocon* Brown & Pils. Paratype and type.
Fig. 6.—*Pteria inornata* (Gabb). Type.
Fig. 7.—*Pteria inornata* (Gabb). No. 2641. An internal cast.
Figs. 8, 9.—*Amusium papyraceum* (Gabb). Type and internal cast of another valve.

Plate XLIV.—Figs. 1, 2.—*Pecten soror* (Gabb). Concave valve and detail o sculpture Type.
Figs. 3, 6.—*Pecten thetidis* Sowb. No. 2858.
Figs. 4. 5.—*Pecten thetidis pelei* Pils. & Johns. Type.
Figs. 7, 8, 9.—*Pecten ischnon* Pils. & Johns. Type and paratype.

Plate XLV.—Figs. 1, 2.—*Pecten plurinominis* Pils. & Johns. Type.
Fig. 3.—*Pecten interlincatus* Gabb. Type.
Figs. 4, 5, 6.—*Pecten oxygonum* Sowb. No. 2867, with detail of basal margin.
Figs. 7, 8.—*Pecten augusticostatus* Gabb. Type, with detail of basal edge of same.
Fig. 9.—*Pecten usclmæ* Pils. & Johns. Type.
Fig. 10.—*Venericardia aversa* Pils. & Johns. Type.
Fig. 11 —*Pecten inaequalis* Sowb. No. 2847.
Fig. 12.—*Pecten eccentricus* Gabb. Type.
Fig. 13.—*Pecten correctus* Pils. & Johns. Type.
Fig. 14.—*Venericardia scabricostata* Gabb. Type.

Plate XLVI.—Figs. 1, 2.—*Echinochama yaquensis trachyderma* Pils. & Johns. Type and paratype.
Fig. 3.—*Lucina mauryæ* Pils. & Johns. Type.
Fig. 4, 5.—*Metis efferta* Pils. & Johns. Type.
Fig. 6.—*Lucina bulla* (Gabb). Type.
Fig. 7.—*Metis chipolana* Dall. No. 2671.

Fig. 8.—*Metis postrema* Pils. & Johns. Type.
Fig. 9.—*Semele delimata* Pils. & Johns. Type.
Fig. 10.—*Semele firma* Pils. & Johns. Type.
Fig. 11.—*Labiosa gabbi* Pils. & Johns. Type.
Figs. 12, 13.—*Corbula dominicensis* Gabb. Cotypes.
Fig. 14.—*Corbula knoxiana fossilis* Pils. & Johns. Type.

PLATE XLVII.—Fig. 1, 2.—*Chione santodomingensis* Pils. & Johns. Type.
Figs. 3, 4, 5.—*Chione guppyana* Gabb. Type.
Figs. 6, 7.—*Chione primigenia* Pils. & Johns. Type.
Fig. 8.—*Cyclina cyclica domingensis* Pils. & Johns. Type.
Fig. 9.—*Dosinia azuana* Pils. & Johns. Type.
Fig. 10.—*Pitar acuticostatus* (Gabb). Type.
Fig. 11.—*Pitar tryonianus* (Gabb). Type.
Figs. 12, 13.—*Chione socia* Pils. & Johns. Type.

Figs. 8, 9 natural size, the others enlarged.